VIRGINIA MEDICAL MONTHLY

OFFICIAL PUBLICATION OF THE MEDICAL SOCIETY OF VIRGINIA

Vol. 66, No. 10.
WHOLE No. 1048.

RICHMOND, VA., OCTOBER, 1939

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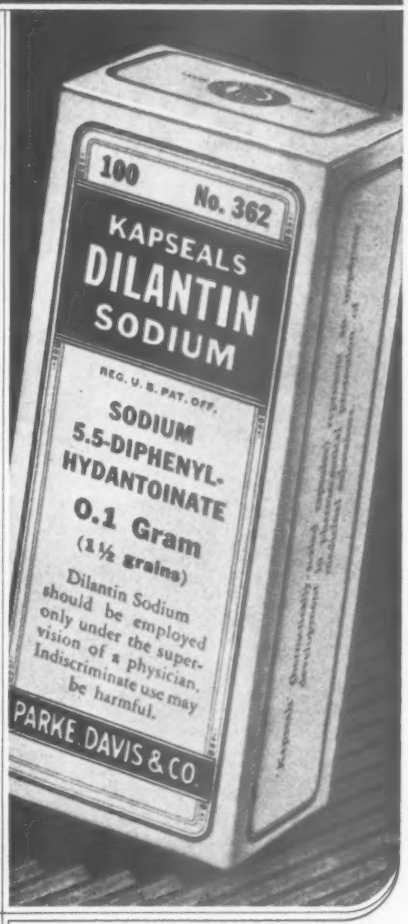

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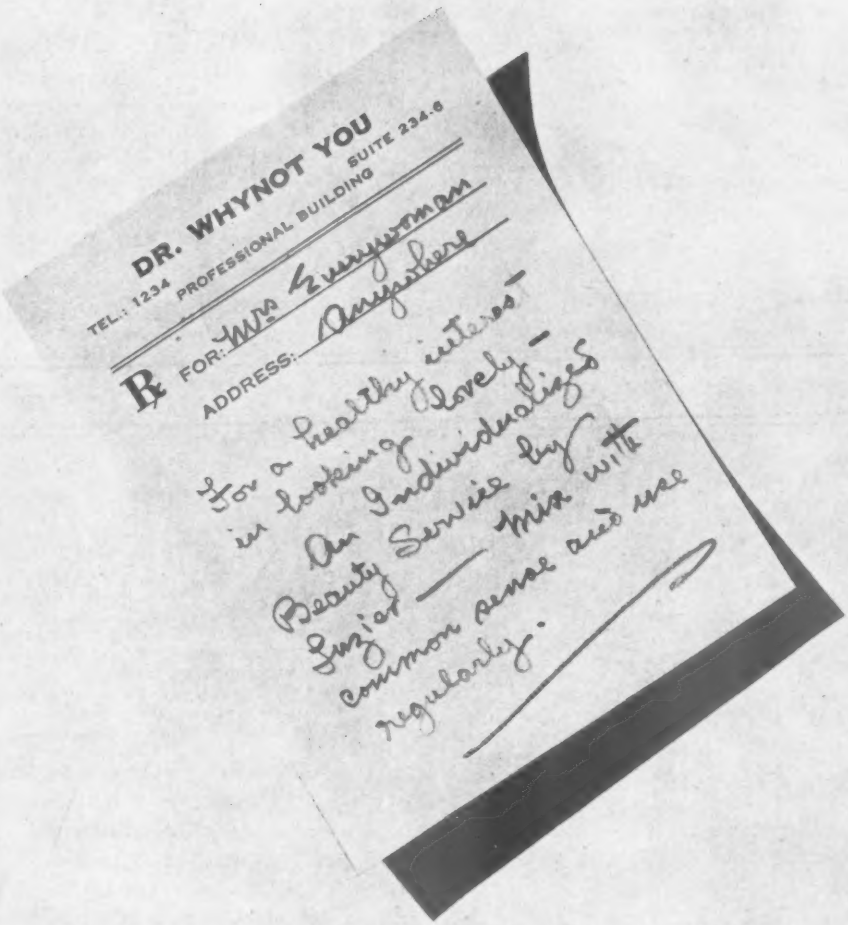

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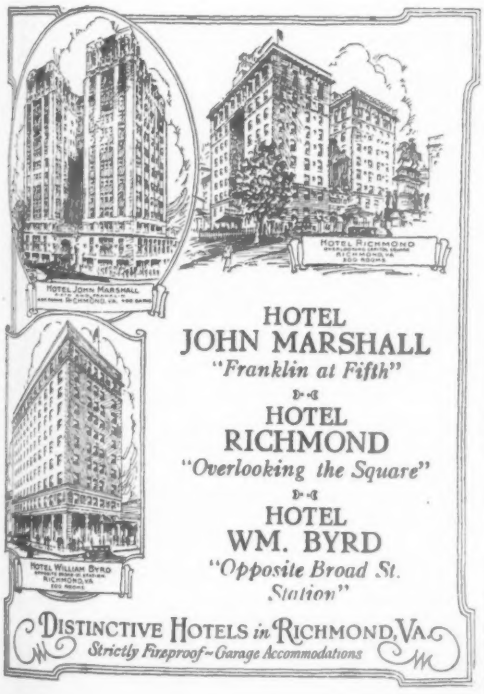

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RICHMOND, VA., OCTOBER, 1939

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HERNIATION OF THE INTERVERTEBRAL DISC AND ASSOCIATED LESIONS—WITH REPORT OF CASES.

HOMER L. SKINNER, M.D., F.A.C.S.,
Chief Surgeon, U. S. Marine Hospital,
Baltimore, Maryland,
and
JAMES T. ROUNTREE, M.D.,
Surgeon, Cora-Miller Memorial Hospital,
Woodstock, Virginia.

The question of sciatica and low-back pain has been one of the chief economical considerations for many years, and the chiropractors have reaped a harvest from physicians' inability to successfully cope with this problem. We have advocated many worthwhile treatments, such as fever therapy, medicinal therapy, removal of foci of infection, fasciotomy, X-ray therapy to the nerve root, extradural and intradural injections and spinal fusion, which have been in many instances gratifying, but in other cases without results. For the above reason, the treatment of a particular group of these cases has been welcomed and studied by the medical profession.

The treatment of this condition is not offered as a panacea for all back cases, but it is believed that the majority of buttock and sciatica pain cases have a good possibility of being due to a herniated intervertebral disc and that this diagnosis should be ruled out before radical procedure, such as spinal fusion, is resorted to.

The anatomy of the spinal column and cord will not be discussed in detail. However, Figure A shows that the cord ends at the lower border of the first or the upper border of the second lumbar vertebra, and the thecal covering extends some distance inferiorly. Anterior to the bodies of the vertebra, the strong anterior longitudinal ligament, and posterior to the vertebral bodies is the posterior longitudinal ligament. The interspinous ligament connects the spinous processes and the ligamentum flava is attached to the laminae and in some regions bridges the intervertebral foramina through which the nerve roots pass. (See Figure B). These latter ligaments have been proven to be the cause of radiculitis by means of their hypertrophy. The intervertebral discs which lie between each vertebral body are composed of three main components, and are: (1) the annulus fibrosis which surrounds the disc and holds the exposed components, not adjoining bone, in place; (2) the fibrocartilage disc itself, in which is the third and most interesting component—the nucleus pulposus, a remnant of the chorda dorsalis. The nucleus pulposus is comparable to a hydraulic shock absorber; it is a gelatinous body which is compressible to a certain degree in its closed compartment. Histologically, it is peculiar and is neither hyalin nor fibrocartilage in its normal state, but upon extrusion it becomes very similar to fibrocartilage; thus it has a tendency, if in this state, to regenerate. It is this latter part which protrudes and causes irritation of the nerve elements if there is a traumatic, pathological, or inherent weakness of the surrounding component tissues. In various ages the nucleus pulposus is variable in structure, as was brought out by Beadle of England. Generally speaking, the younger the individual the higher water content of the nucleus and the more elasticity of the nucleus pulposus in the younger age group and the less elastic and more fibrous in the older age group.

The physiology of the spinal fluid is still under discussion, but the general opinion is that the fluid that circulates in the cerebrospinal channel is a modified form of lymph produced by the choroid plexuses, and after circulating through this channel

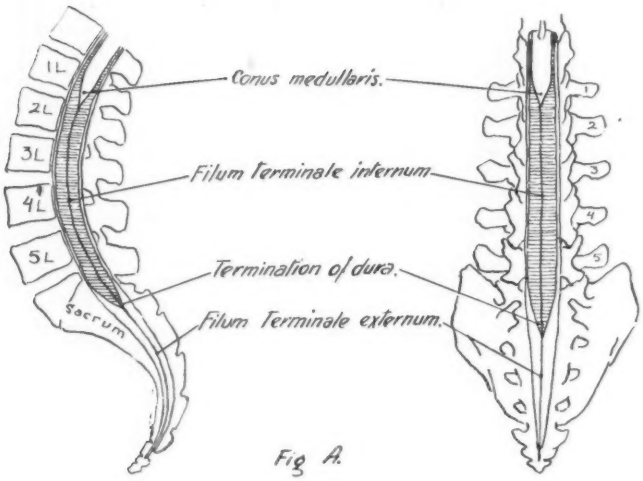


Fig A.

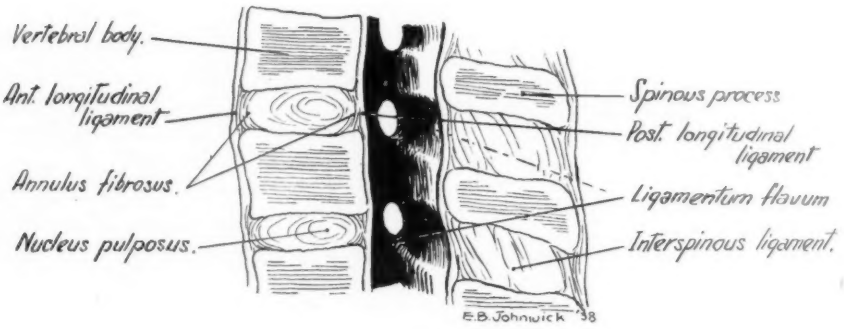
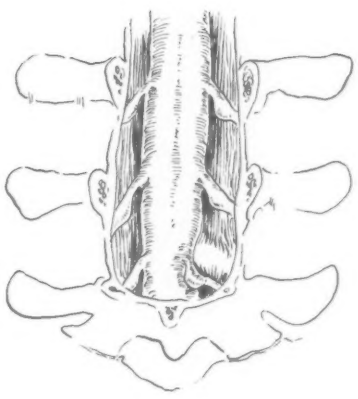


Fig B.

it is absorbed by the arachnoidal granulations and the lymphatics of the brain and spinal cord. The chemistry of the spinal fluid is well known.

A historical survey shows that the first careful study of herniation of the intervertebral disc was done by Schmorl, who found and reported 737 cases in a series of slightly over 2,000 autopsies of the spinal column. Many of these cases showed a herniation of the nucleus pulposus into the cancellus body of the vertebra, but he also found that some of the cases showed rupture into the surrounding soft tissues. In 1896, Kocher reported a case of rupture of the intervertebral disc in a young man who fell from the height of 100 feet, landing in a standing position. He died of internal injuries in a few hours and autopsy showed that he had a rupture of the disc between the first and second lumbar vertebrae without fracture of the vertebral bodies. In 1911, Middleton and Teacher, of Scotland, reported two cases—both found on autopsy. Also in this year, Goldthwait reported a case suffering from marked sacro-iliac strain who developed a flaccid paralysis of a leg, with a disturbance of the genito-urinary system and incontinence of feces following manipulation under ether for remedy of sacro-iliac disease. The first operation on the spinal cord to be reported was done by Victor Horsley and reported in 1889. Thus, we see that this is an old disease with a new name because neurological surgeons have for many years recognized and know the cartilaginous tumor, which is extradural and arises from the intervertebral disc, and that this tumor may cause, through pressure on the spinal cord or cauda equina, neurological symptoms. Adson has reported cases, calling them fibro-



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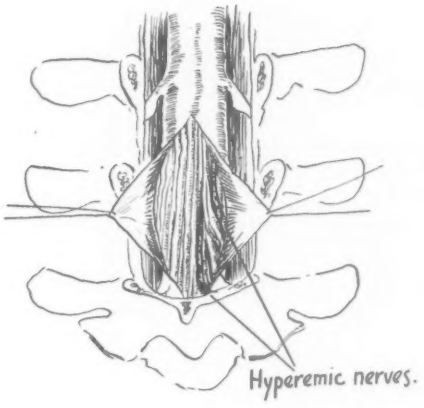

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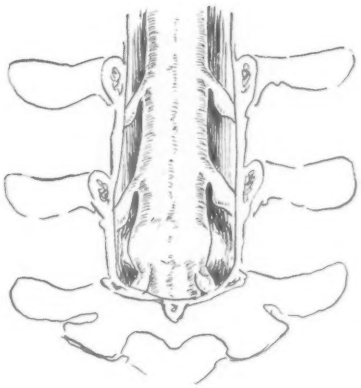

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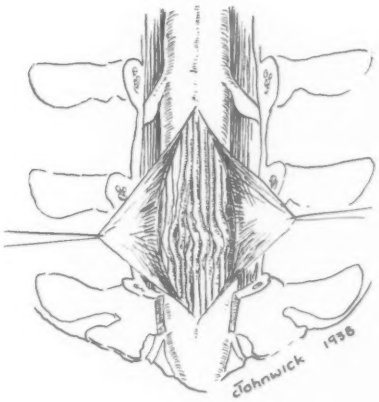
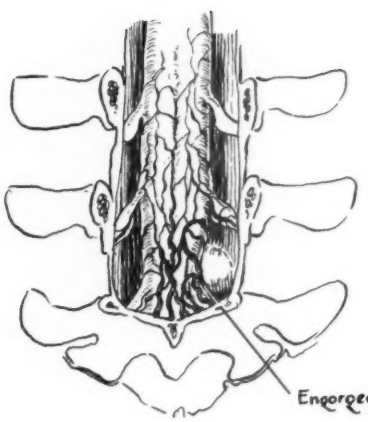


4.

chondromata. Ellsburg and Stookey reported early cases and concluded that the tumor was benign, and that the terms chondroma or ecchondrosis best described the condition. The histological examination of the material removed at operation of their cases showed apparently normal disc tissue. In 1929, Dandy reported two cases of loose cartilage and he considered the condition similar to osteochondritis desiccans. Of late, Bailey, Mixter, Love and Williams have reported cases of herniated intervertebral discs. A most instructive article on this condition by Hampton and Robinson appeared in the December, 1936, *American Journal of Roentgenology*. Other American, German and French authors have contributed to this copy.

In discussing the diagnosis of herniated intervertebral discs, one must first remind the reader that many conditions, such carcinoma of the bladder and rectum, prostatitis, myositis, renal pathology, intra-abdominal conditions, arthritis, neoplasm of the cord and its theca, vertebral fracture and compression, hypertrophied ligament flava and similar conditions must be ruled out. It is our opinion that at least 70 per cent of all true sciaticas have some impingement upon the radices of the nerve supply affected, and that they may be cured by proper surgery. We must keep in mind that it is essential that we treat the cause and not the effect of these conditions. The usual picture presented is a patient who has had expert medical attention and has had various diagnoses and treatment with no relief.

Trauma is probably present in all cases but, be-



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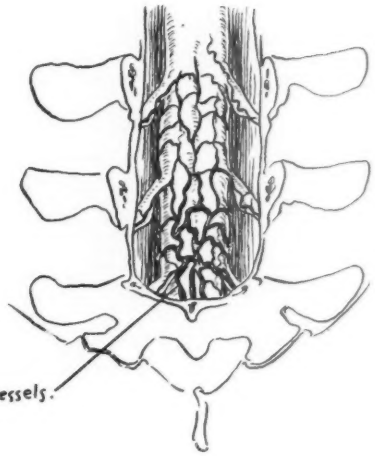

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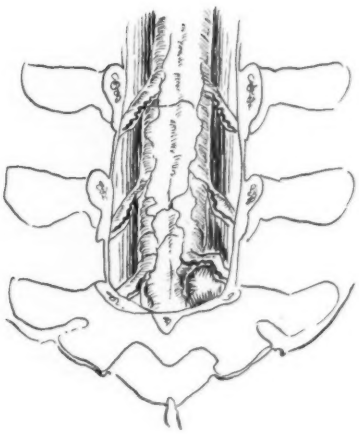

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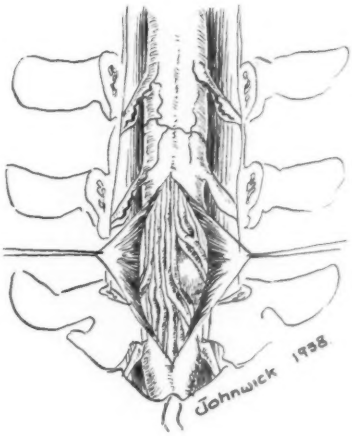


8.

cause of its insignificance, will often not be remembered. Repeated minor trauma is of most importance. It is believed that the most probable position to induce disc herniation posteriorly or posterio-laterally against the radices or cauda is that of flexion when the anterior ligaments are relaxed and the posterior ligaments of the spine are under tension. Thus, while straining in a bent-over position, the patient will often suffer his primary severe sciatic pain which may be severe enough to cause him to fall to the ground. Other cases may give a history of direct trauma, such as falling on the buttocks or direct force to the spine at the affected area. It has been suggested that strenuous spinal or sacro-iliac manipulations may cause or predispose to the herniation of the intervertebral disc. Some of our cases have had their symptoms aggravated after manipulation. There are others who claim that repeated trauma by a too-far introduced spinal puncture needle may cause tearing of the annulus fibrosis or posterior ligament with weakening of these structures, and thus predisposing to a nucleus pulposus herniation. We have been unable to find any familiar sciaticas so we cannot connect any hereditary weakness with this condition at present.

The tendency for this disease is probably in the male because of their more laborious duties; however, it is not uncommon in women. The age incident in our cases was 39.8 years, with a variation from twenty-six to fifty-six years. Other authors

claim a larger variation but all agree that the condition is most common in middle age. We have had only one case in a colored man, but it is possible that this race is less likely to seek relief until far advanced, so it is probable that more cases will be found in this race. No other racial predisposition has been noticed. The most important symptoms are: localization of the pain; its radiation down the sciatic nerve or its branches, especially on coughing, sneezing or defecation; disturbances in cutaneous sensations; and the constancy or inconstancy of the pain. The pain should radiate along the course of one of the lumbar or sacral nerves in practically every instance and this radiation should be influenced in the majority of cases by any straining effort. Disturbance in sensation, symptomatic, will often be present over the buttocks and lateral or posterior surface of the affected thigh but, due to the overlapping of the cutaneous sensory nerve supply, this symptom may not be demonstrable by neurological examination. The pain will usually be constant but will vary greatly from time to time, and will often be affected by changes in the climate. Partial remissions do occur, but with recurrence of symptoms they are usually more severe. The patient may state that he gets relief in a standing position, or that he is relieved when lying down; this is not constant in every case. In certain cases, there may be definite neurological findings such as "saddle" anesthesia, paraplegia, and so forth, but this is not the usual occurrence.

The patient should be given a complete physical examination and should be carefully checked for any nutritional disease or any of the other conditions noted previously in this paper, because they may mimic some of the findings of herniated intervertebral disc. A neurological examination should be done, and there are some rather characteristic findings. The patient will often stand with a list of the affected side and walk with a limp favoring the extension of the affected thigh. There may be flattening of the buttock due to some relaxation of the gluteus muscle and a lowering of the gluteal fold of the affected side. There will often be some atrophy by measurement of the affected thigh. There should be no shortening of either extremity. The dorsalis pedis pulse should be present and bilaterally equal, and the temperature should be equal in both extremities. The sensations—sharp, dull, hot and cold—may be impaired but, if so, will be vague and not limited to any anatomical area. We have found in several instances a symptomatic numbness of the thigh, which could not be proven by examination. Examination to eliminate sacro-iliac disease, rupture of a sacro-iliac cartilage, hip-joint disease and fibrositis of the ilio-tibial band should be done. One cannot depend upon these tests for clinical conclusion as they may overlap. Thus a patient with hip-joint disease may give a positive Ober's or sacro-iliac sign in addition to the diagnostic sign. The straight-leg raising test and Kernig's sign are most important and are often positive in these lesions on the affected thigh. Reflexes are usually normal and equal but may be exaggerated. A peculiar phenomena is the nearly constant diminution or loss of the Achilles' reflex of the affected limb; this sign is best elicited by having the patient stand on his knees on an examining table and face the wall. An examination of this type, along with the history, will give one an opinion whether or not the symptoms are due to an intervertebral disc herniation, or compression of a nerve root by some surrounding structure.

Our routine spinal puncture study is to put a needle in the area between the second and third lumbar spines, introducing it into the subarachnoid space, attaching a manometer and taking the spinal fluid pressure reading. A Queckenstedt test is done to rule out any obstruction along the cord proper. Another needle is then introduced into the sacral hiatus extradurally. Into this needle, 40 cc. of 2 per cent procain, in 10 cc. amounts, is injected and the manometric pressure noted. This test was devised by Dr. J. G. Love, at the Mayo Foundation, and has been suggestive in three of our cases. If there is a complete or partial block between the caudal and lumbar needle, the manometric pressure will rise slowly, slightly or not at all. After this test, we send a specimen of the spinal fluid to the laboratory for cell count, globulin, Kahn, gum mastic curve and total protein determination. The total protein content has been emphasized by some authors as being elevated in cases of herniated intervertebral discs, but all of our cases have been in the range of normal.

After the patient has recovered from the above procedure, if the findings are of sufficient weight, the patient is sent to the X-ray room and placed on the fluoroscopic table which is equipped with facilities

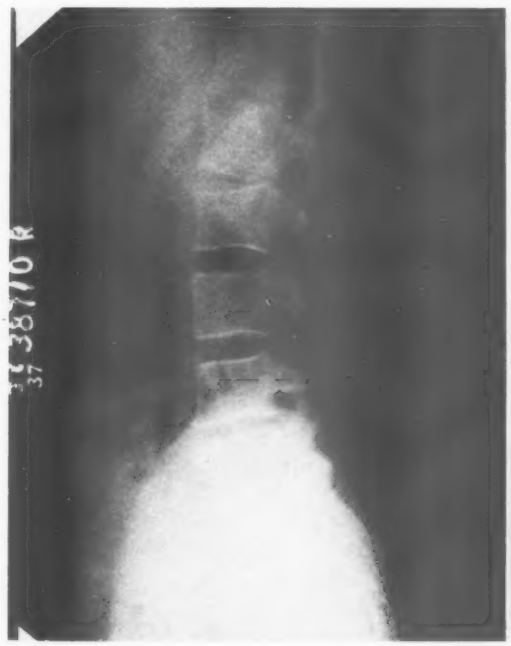
for any change of position of the patient. A spinal puncture is now done between the second and third lumbar vertebrae and, by means of a large-bore spinal needle and warming the solution of lipiodol, 4 to 5 cc. is injected into the subarachnoid space. The above procedure is not difficult, but a great deal of care is necessary because it is tedious to force the viscid lipiodol through a needle and not change the original position of the needle. We have seen a case in which the lipiodol was injected partially extradurally, and not only was the opportunity lost for immediate localization of a lesion, but also was lost for future examination in this area for some time. It is, in our opinion, most important that fluoroscopic examination be immediately made and, upon localization of the filling defect, X-ray should be made at various angles in this area. Extreme Fowler's position is maintained over-night and repeated X-rays are taken the next morning to determine if the defect is permanent. Physicians, with good cause, hesitate to inject lipiodol into the subarachnoid space because no one has proven what finally happens to this substance. The manufacturers claim that, due to the lipiodinesis, the lipiodol is slowly absorbed from any body tissue, taking from several months to several years. They also state that it does not become encysted in fibrous tissue as do other foreign bodies. Many authors claim no ill-effects of spinal injections of lipiodol (Sicard and J. Forestier, Globus and Strauss, Hampton and Robinson, Lindblom, Mixter, *et al*). It is known that if there is discoloration of lipiodol due to deterioration there may be some accident. Iodism is rare, even in those sensitive, due to the slow absorption of the lipiodol. Air injection has been reported successful in some cases of complete subarachnoid block, but we have been unable to the present time to get sufficient detail for the diagnosis of slight subarachnoidal compression. We have used skiodan and other materials on cadavers and dogs, but up to date we have obtained no definite satisfactory results. We are continuing this line of study in the hope of finding a good contrast media that is absorbed fairly rapidly with no damage to the thecal nerve tissue.

Lipiodol defects in the subarachnoid space may be due to artefact, arachnoiditis, spina bifida with meningocele, spinal neoplasm, hypertrophied ligamentum flava, and occasionally exostosis of the bony canal in addition to herniation of an intervertebral disc. Herniation of an intervertebral disc may occur in any region from the cervical to the sacral area; also multiple herniations at various levels have been reported. Pressure on the cord above the second lumbar vertebra will usually give definite localizing neurological signs due to the complete filling of the bony canal by the cord, and can be located by these findings.

Before operation, the defect found by injection of lipiodol is studied carefully for localization of the lesion and, if possible, relationship to the nerve root. This is of value because, if the lesion is well localized, less lamina will have to be removed for operative visualization. However, we have noted that it does not seem to matter in the convalescing of the patient whether a hemilaminectomy has been performed, or whether only a portion of the lamina on the affected side was removed. The patient is given avertin and ether, or ether anesthesia alone and placed on the operating table in a prone position, with the trunk and lower extremities flexed to approximately an angle of twenty-thirty degrees. Nothing is placed under the abdomen in an attempt to make the lumbar vertebra more accessible, as this does not help but complicates matters by increasing the amount of bleeding. After the routine preparation, a curved incision is made to the left or right of the spine, extending from the spinous process of the second lumbar vertebra to the sacrum. The spinous processes and laminae are exposed in the usual manner along with the upper part of the sacrum. The spinous process of the vertebra just above the lesion is removed along with the lamina on the affected side. In removing the lamina, the continuation of the ligamentum flava anteriorly is preserved for two reasons: first, to use as lateral traction in exposure, and, second, it prevents one from tearing any blood vessels over the cord which may be greatly enlarged. After the lamina is removed, the ligament is carefully incised and the dura exposed. Palpation will then usually reveal a semispherical mass which feels like and has the consistency of, a hard rubber cork. Lateral traction is then made on the ligament, and the cord, with dura intact, is gently displaced to the opposite side. Great care is necessary in this maneuver as there is a rich plexus of blood vessels around the dura which are easily torn and bleed freely. If bleeding is incurred, some time will be lost in controlling the hemorrhage. When a lesion is visualized,

it is well to note the relationship to the affected nerve. In some, the nerve may be pushed medially (see Figure I); in others it may be pushed laterally (see Figure VII). The nerve may make its exit almost at a right angle or may travel quite a distance in the canal outside the dura before it passes out its foramen. If the lesion is one as noted in Figure I, it is usually easy to complete the exposure—incise the posterior ligament and the disc will at once present itself. Upon incising the ligament the disc exudes as if under pressure, at first appearing like sebaceous material but later fibrocartilaginous in character. If the lesion is one as noted in Figure VII, it will be necessary to displace the nerve outward and upward before removing the disc. The affected nerves are injected and hyperemic in comparison to the normal pale nerve (see Figure II). The contrast is easily noted. After removal of the disc, one can usually demonstrate a small opening down into the intervertebral space. We feel that this opening fills in with granulation and heals over with fibrous tissue. When all bleeding is controlled, the dura is opened and as much lipiodol as possible removed. We have found that it is practically impossible to remove all the lipiodol present. As in some cases, we have removed considerable fluid and alternated the position of the patient several times. The dura is closed with fine silk. The wound is closed with deep interrupted chromic number two catgut sutures. These sutures go between the presenting spinous processes. A few more interrupted sutures are placed superficially in the sacrospinalis fascia, and the skin closed with interrupted dermal stitches. A rubber tissue drain is left in place for forty-eight hours.

In addition to simple rupture of the intervertebral disc and different relationships of the nerve root, we have found generalized hypertrophy of the annulus fibrosis and ligamentum flava as shown in Figures III and IV. One of these cases also had marked varicosities of the veins around the dura and along the nerve root (see Figures V and VI). In the only case in which we had a narrowed intervertebral space, the lesion was located longitudinally rather than transversely along the intervertebral space. The lesion extended on to each vertebra for a distance of about one-half inch, causing considerable pressure on the cord. This lesion was calcified and it was necessary to resort to rongeurs for its removal.



Case 1.
Lateral view showing straight lumbar spine.

Oblique view showing defect between 5th lumbar and sacrum.

CASE REPORTS

Case 1.—J. W., seaman, age forty. First admission to hospital—January, 1937.

Chief Complaint: Pain in his right hip, radiating down his right leg.

History: The pain has been present for several months, accentuated by walking or on any straining effort. It was first noticed when he arose from a sitting position at which time he was taken with a sudden severe pain in the lower part of his back. Since then it has been constant with periods of remission. There was no history of injury. He was given the usual conservative treatment and also an Ober's fasciotomy was performed with temporary relief of his sciatica. He was discharged after a period of approximately six months and returned on August 4, 1937, with the same symptoms.

Examination: The patient stands erect with loss of lumbar lordosis and marked limitation of the spine in all directions. There was tenderness over the sciatic notch and along the course of the sciatic nerve. There were no sensory disturbances in the lower extremity. The reflexes were normal. There was no atrophy of either extremity.

Laboratory Findings: The routine laboratory work was entirely negative. The reverse Queckenstedt test was normal and the fluid grossly appeared normal. Total protein determination of the spinal fluid showed 40 mgm. per one thousand and a slight reduction in sugar. Lipiodol injection in the subarachnoid space showed a defect in the lower lumbar region.

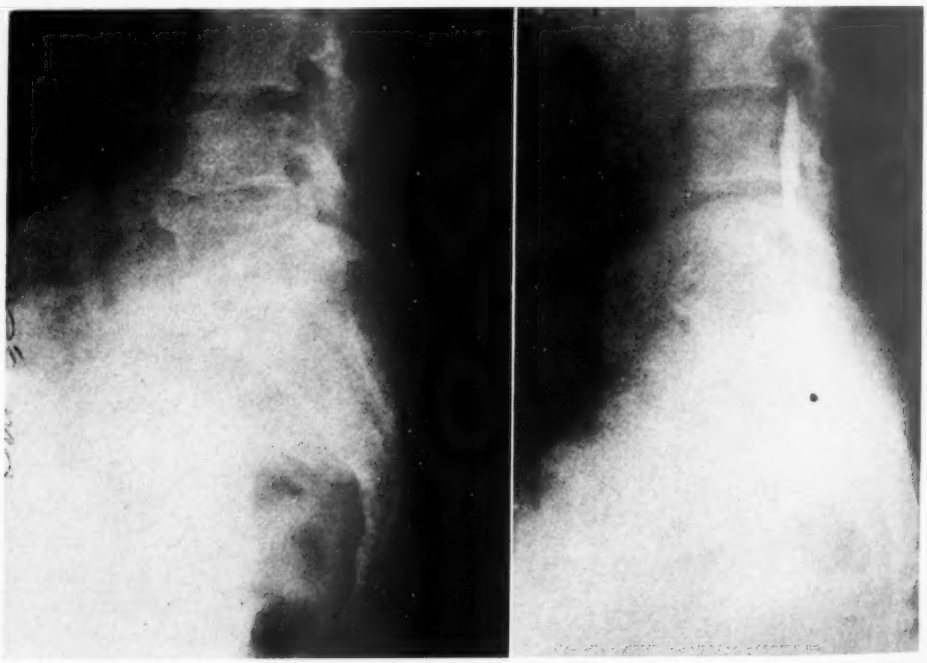
Operation: A definite elevation was found similar to lesion presented in Figure I with the nerve root directly over the herniated disc. The nerve root was hyperemic.

Final Examination: Patient was last seen in February, 1938, four months after operation and had complete recovery. He is now employed in his old capacity as seaman.

Case 2.—J. E., general foreman, age forty-eight. Admitted to hospital—September 13, 1937.

Chief Complaint: Numbness in the lower part of his back, with sharp, shooting pains down the right leg.

History: This patient fell on April 30, 1937, a distance of about four feet, and struck his right hip on a stone. Following this he had considerable



Case 2.

Notice narrowing of intervertebral space and bridging anteriorly between vertebrae.

Lateral view showing long defect. Also demonstrates lesion in midline.

discomfort in his back and was treated by traction on his leg and a body cast. His symptoms improved but the pain and soreness persisted, especially down the posterior part of his right thigh and calf.

Examination: There was a slight scoliosis to the left in the lumbar region with muscle spasm on the same side. Pain was elicited on pressure over the lumbosacral joint. There was no tenderness in either sacro-iliac region. Forward bending caused pain in the region of the lumbosacral joint and a straight leg-raising test caused pain along the course of the right sciatic nerve. There was no atrophy of either extremity. The reflexes were normal and there were no sensory changes present.

Laboratory Findings: The routine laboratory examinations were normal. *X-ray* showed the fourth and fifth lumbar vertebrae had gross lipping of the anterior margins of the articular surfaces with some narrowing of the joint space. A reverse Queckenstedt test was suggestive. Total protein determination of the spinal fluid showed 11 mgm. per one thousand. Injection of the subarachnoid space with lipiodol showed a filling defect in the lower lumbar region.

Operation: A longitudinal defect was found which was removed transdurally. It was calcified and microscopic section revealed annulus fibrosis and nucleus pulposus.

Final Examination: Subsequent examination four months after operation showed only stiffness over site of operation. The patient was playing basketball in his local Y.M.C.A. at regular intervals at this time.

Case 3.—L. B., seaman, age thirty-three. Occupation, oiler. Admitted to hospital—September 3, 1937.

Chief Complaint: Pain in the lower portion of his back, radiating down each leg, especially on the left.

History: This patient gave a history of low progressive back pain for about two years . At first the pain was hardly noticeable, but has gradually increased in severity. It is aggravated by exercise, coughing, any effort or straining. There was no history of injury.

Examination: There was loss of normal lumbar lordosis, with limitation of motion in the spine, apparently due to pain in the posterior part of the thigh. There was no atrophy of either extremity. The reflexes were normal and there were no sensory disturbances.

Laboratory Findings: The routine laboratory examinations were normal. The reverse Queckenstedt test was suggestive. The spinal fluid showed total protein from 22 to 35 mgm. per one thousand. Lipiodol injections showed a defect between the fourth and fifth lumbar vertebrae more marked on the right.

Operation: The patient was operated on October 18, 1937, exposing the cord below the fourth lumbar lamina. There was a generalized elevation and thickened ligamentum flava between the fourth and fifth lumbar vertebrae (see Figures V and VI) with marked engorgement of the veins around the cord. Immediate post-operative convalescence was normal and the patient had complete relief from pain in the left thigh and leg. About ten days following the operation, he began to complain of pain in the right thigh and leg which continued after being out of bed and became very annoying to the patient. He was re-operated on November 29, 1937, and the same findings were found on the right side. Immediate post-operative convalescence was good and the patient obtained complete relief. He was discharged December 21, 1937.

Final Examination: This patient has been seen several times since; the last examination being April, 1938 (five months after last operation) at which time he felt fine, had no neurological findings and was doing hard work as a seaman.

Case 4.—E. W., quartermaster, white, age twenty-six. Admitted to hospital—September 9, 1937.

Chief Complaint: Pain in the back of his right leg which "draws him up".

History: He does not remember exactly, but some time during the summer he developed a soreness in the right upper thigh, posteriorly, with some pain on motion. This has continued to become worse and now, upon straightening the leg or putting tension on the back of the leg in any manner, it causes pain and drawing in the right thigh and leg, posteriorly. He states that when bending his neck forward, it causes pain in the posterior part of his thigh and leg. The pain is aggravated on walking and, after exercise, his foot feels numb. Coughing or any straining effort aggravates the pain. There is no history of injury. The pain disappears while at rest or when in a prone position.

Examination: Negative except that Kernig's sign was positive with adductor spasm and tenderness over the course of the right sciatic nerve.

Laboratory Findings: The routine laboratory examinations were normal. The reverse Queckenstedt test was positive. The total protein determination of the spinal fluid showed 25 mgm. per one thousand. The lipiodol injection of the spine showed a defect in the region of the lumbosacral joint.

Operation: A definite elevation was found with the nerve in direct relation with the lesion. The nerve ran a considerable distance in the spinal canal outside the dural sheath before emerging from the vertebral foramina.

Final Examination: Patient last examined in March, 1938, and no evidence of any abnormality found. He was seen at the hospital in April, at which time he stated that he was doing his usual work now without inconvenience.

Case 5.—C. B., structural iron worker, white, age forty-one. Admitted to hospital—November 1, 1937.

Chief Complaint: Pain in left hip and leg for past fifteen days.

History: For the last few months, he has noticed that the lower part of his back was aching a little and that it radiated down into his left hip. This pain gradually went down the back of his leg to his heel; he describes the pain as dull, aching in character and that it is worse in the morning when he first gets up and at night after a day's work. Sitting or lying down in one position seems to make it worse. Damp weather also aggravates it. He also states that he has had a numbness in the anterior thigh for the past year and has had repeated attacks of this same trouble during this time. The pain he complained of at first examination was localized over the lower part of his back on the left side and below the posterior crest of the ilium. He also complained of numbness of the leg below the knee along the outer side.

Case 5.
Oblique view showing defect between 5th lumbar and sacrum.

Examination: The patient stands erect with a normal lumbar curve and free motion of his spine. The left buttock appears more relaxed than the right and the left gluteal fold is lover. There is pain and tenderness down the posterior surface of his thigh and leg. There are no demonstrable areas of anesthesia of the skin in the lower extremity. There is tenderness over the gluteal plexus on the left. His knee-jerks are equal. The Achilles' tendon reflexes are equal. His left thigh is one inch smaller than his right, ten inches below the anterior superior spine. Kernig's sign is positive with adductor spasm on the left.

Laboratory Findings: The routine laboratory examinations were normal. The reverse Queckenstedt test was normal. Spinal fluid appeared clear, with 24 mgm. per one thousand of total protein. Lipiodol injection showed a filling defect on the left side, on a level with the lumbosacral joint.

Operation: A definite herniation of the disc was found in this case lying in the axillary fold between nerve root and dura (as demonstrated in Figure VII).

Final Examination: The patient was discharged about two months after the operation and, at that time, all signs and symptoms had disappeared. An indirect report was received that he was back working as a structural iron worker but he has not yet returned for final examination.

Case 6.—W. M., U. S. Employees' Compensation Commission case, age thirty-six; occupation—painter. Admitted to hospital—November 30, 1937.

Chief Complaint: Pain in his back.

History: On June 7, 1937, while moving a large cabinet, patient suddenly felt a very sharp pain in his left lower back which he described as "something were pulling loose". He fell on the floor and remained there for some time because of the severe

Case 6.
Showing defect between 5th lumbar and sacrum. (Notice elevation and compression of the axillary fold on the left side.)

pain. Since then, the condition has resisted treatment and continues as a dull aching pain in the left lower back, radiating up and down the spine and down his legs to his heels, more noticeable on the left. He also complains of peculiar numbness and anesthesia in his hands and feet. He claims that he is losing grip in his left hand and, at times, his left leg is weak. He is very nervous and has been having headaches for the last few weeks. All of the above symptoms have become progressively worse in the last few weeks. He complains of numbness along the outer side of his left thigh and states that the pain is aggravated on coughing or any straining effort.

Examination: The patient stands with a slight list to the left and some curvature of his spine. The motion of his spine is guarded in all directions and he states that it is painful especially on bending forward. There are no particular tender areas. Kernig's sign is positive on the left with some adductor spasm. The knee-jerks and ankle-jerks are equal and active. There are no areas of anesthesia in the lower extremity, and both extremities are of the same size.

Laboratory Findings: The routine laboratory examinations were normal except for positive Kahn and Kline. A reverse Queckenstedt test was suggestive. The spinal fluid showed 25 mgm. per one thousand of total protein. Lipiodol injection showed a filling defect on the left side in the lower lumbar region. X-ray also showed that there were six lumbar vertebrae present.

Comment: This patient had been examined by several physicians and has had diagnoses from back strain to malingering.

Operation: A large elevation was found in this case in direct relationship with the nerve root (demonstrated in Figure VIII).

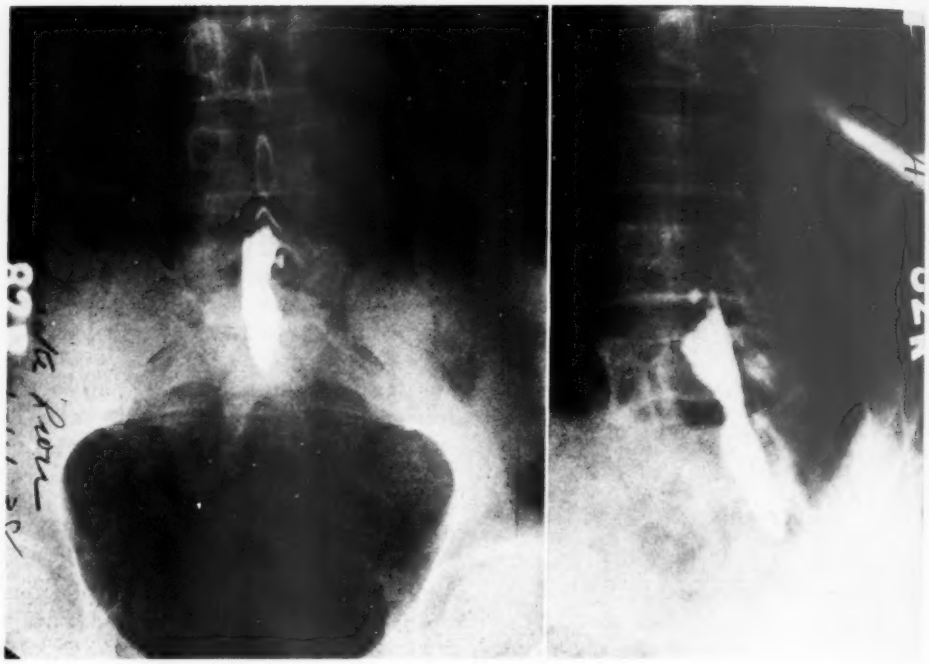
Final Examination: After the operation the patient had complete relief of all symptoms and examination showed only stiffness of lower lumbar region at the site of the operation. On March 15, 1938, he was re-admitted because of a mild persistent right sciatica. The left side had caused no trouble since operation. X-ray examination showed a collection of bismuth in the region of the right sciatic notch. It is, of course, questionable as to the possibility of sciatic irritation from this bismuth but as this was a possibility the patient was discharged to return for further check in sixty days.

Case 7.—L. C., U. S. Employees' Compensation Commission case, age thirty-three; occupation—longshoreman. Admitted to hospital—January 9, 1938.

Chief Complaint: Pain in the lower part of his back, radiating down his left leg.

History: This patient suffered an injury on July 19, 1937, when he fell twenty feet on a boat and landed on his feet and fell backward. Since then, he has been able to work only about six weeks and was forced to quit on account of pain in his back, radiating down his left leg. He states that the pain at first was only slight, but since the injury it has increased daily and that now it is sharp, shooting in character, aggravated on bending forward or when he attempts to lift anything. It is also aggravated when straining at stool or coughing and sneezing. He also complains of sexual impotency. He has had the usual conservative treatment with manipulation for sciatica.

Examination: The patient stands erect with some apparent atrophy of the left lower extremity and buttock. There is some muscle spasm of the lower back, with no curvature of the spine. Pain is elicited on motion of the spine and begins at about thirty degrees forward flexion. It is localized opposite the



Case 7.

Anterior posterior view showing defect between 5th lumbar and sacrum.

Oblique view showing defect at lumbo-sacral region.

third lumbar vertebra and radiates down his left thigh. Limitation of motion in the spine appears to be due entirely to the pain and spasm in the posterior part of his left thigh. Measurement of each thigh showed one-half inch atrophy in the left, at the same level. All reflexes were normal and equal. The patient complained of numbness along the outer side of the left leg, but there was no definite area of anesthesia demonstrable.

Laboratory Findings: The routine laboratory examinations were normal. The reverse Queckenstedt test was normal. The spinal fluid appeared grossly normal, with total protein of 24 mgm. per one thousand. Lipiodol injection of the subarachnoid space showed a large filling defect on the level of the lumbosacral joint.

Operation: A herniation of the intervertebral disc was found with the nerve root lying directly on top of the lesion. It was under the first sacral vertebra.

Final Examination: He was last examined in the latter part of February, 1938, at which time there was only slight pain over the incision and some lower lumbar stiffness. He has returned to his usual work.

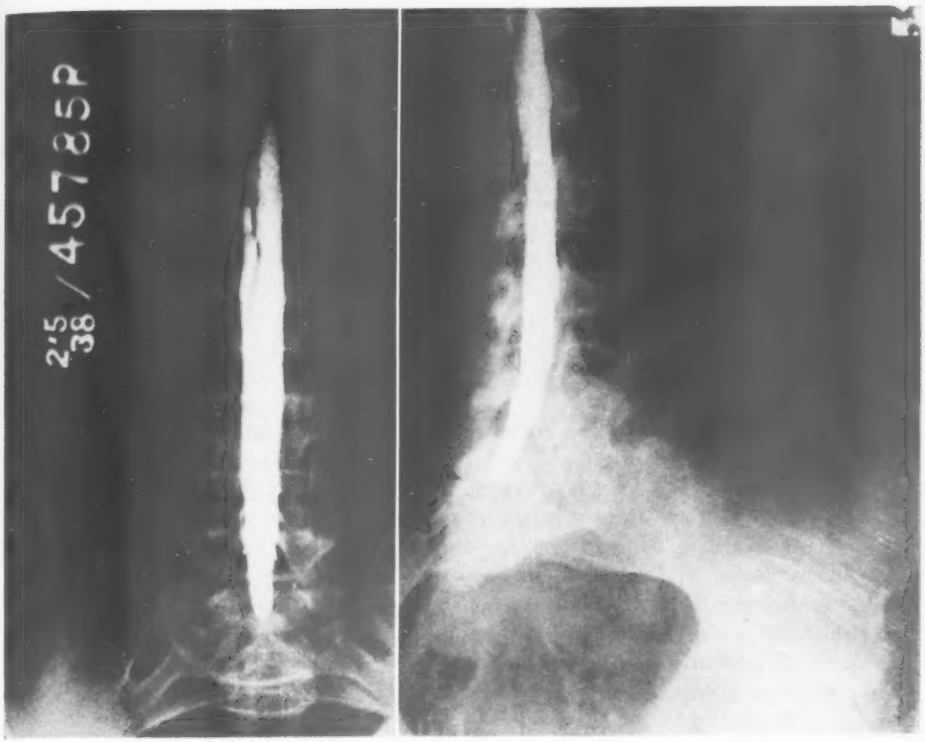
Case 8.—C. H., veteran, age forty-three; occupation—chauffeur. Admitted to hospital—January 3, 1938.

Chief Complaint: Pain in the back and legs.

History: For many years the patient has had a sore back whenever he had a cold. Since December 20, 1937, his back symptoms have increased greatly until he is not able to sleep at night. He states that his legs feel weak and numb and that there is no position in which he can lie down where the pain is relieved. Pain is severe when he strains at stool, upon coughing or any straining effort.

Examination: Essentially negative except there was a diminution of the knee-jerks and an Achilles' tendon reflex on the right lower extremity. Measurement at the same level on each thigh showed one-half inch atrophy of the right thigh.

Laboratory Findings: The routine laboratory examinations were normal. The reverse Queckenstedt test was normal. The spinal fluid appeared normal grossly. The laboratory reported 23 mgm. per one thousand of total protein. Lipiodol injection showed a filling defect in the lower lumbar region.

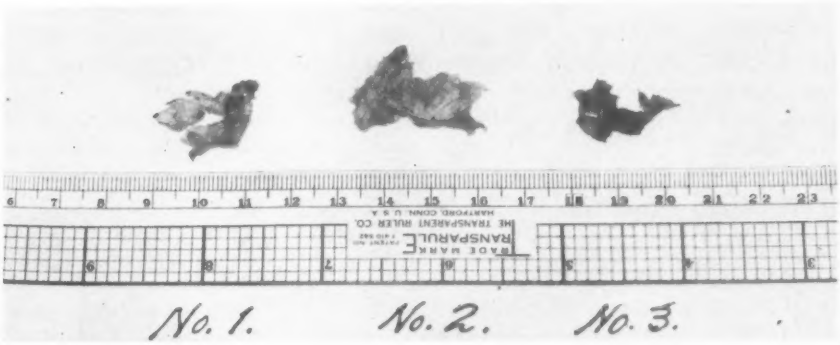


Showing a normal A P view with the use of lipiodol in a cadaver.

Showing a normal lateral oblique in a cadaver.

Operation: A definite hypertrophy of the ligamentum flava over the fifth lumbar nerve root with compression of the same. Following the operation, all pain left the right extremity and hip. Three weeks later a pain developed over the left hip and down the left thigh. Re-operation and exploration of this side showed no gross pathology and the fourth and fifth lumbar nerves were unroofed.

Final Examination: The pain at the present time is still slightly noticeable on the left side and seems to be localized over the left sacro-iliac joint. An injection of this joint with procaine and saline on



No. 1. Specimen removed from case No. 10.
No. 2. Specimen from case No. 6.
No. 3. Specimen from case No. 5.

April 30, 1938, provided complete temporary relief.

Case 9.—L. T., age forty; occupation—fireman. Admitted to hospital—January 10, 1938.

Chief Complaint: Pain in the lower part of his back, radiating down his right leg.

History: The patient had had symptoms for the last eight months, with pain in the lower lumbar region radiating down his right leg. He has had conservative treatment consisting of physiotherapy, nerve injections and a thorough check for foci of infection. There is no definite history of injury in this case, but patient thinks this might have occurred while lifting and pulling on a heavy fire hose. His pain is always worse during damp weather.

Examination: The patient stands erect with no loss of lumbar lordosis. There is a slight scoliosis to the left in the mid-thoracic region. Straining causes radiation into the right buttock. There is spasm of the lumbar muscles on the right. Pain is elicited in the right gluteal region on forward bending at about thirty degrees flexion. There is slight relaxation of the right buttocks with the gluteal fold lower on the right side. Flexion of the right hip causes slight pain with exaggeration of pain on extension of knee. This is not elicited on the left side. All reflexes and measurements normal. Flexion of the neck on the chest causes no pain. Kernig's sign negative. No evidence of hip-joint disease. There is no localized tenderness over the sciatic nerve on either side. No areas of anesthesia present. Dorsalis pedis artery is palpable in each foot.

Laboratory Findings: The routine laboratory examinations were normal. A reverse Queckenstedt test was normal. Total protein determination of the spinal fluid was within normal limits. Lipiodol injection showed a filling defect in the lower lumbar region.

Operation: Revealed a very definite herniation of the nucleus pulposus through the annulus fibrosis on the right side displacing the fourth lumbar nerve posteriorly and upward.

Final Examination: Convalescence was uneventful and examination on discharge, March 12, 1938, revealed only stiffness of the back over the operative site. He is now on regular duty as a fireman.

Case 10.—M. K., seaman, age fifty-six. Admitted to hospital—February 4, 1938.

Chief Complaint: Pain in left hip, moderate, radiating down his leg.

History: On December 20, 1937, patient first had an attack of pain which began in left hip and radiated down the left leg, lasting about ten days. It was continuous and he described it as more of a dull ache and soreness. About two weeks ago, the same pain returned and has been present ever since. He described the pain at this time as severe aching pain, which is worse when he is up and moving around. There is no history of injury.

Examination: On further questioning the patient, he stated that he had had a numbness in his left leg for the last year. He stands erect with loss of lumbar lordosis; the lumbar spine is stiff. There is slight tenderness over the sacro-iliac region on the left. Motion in the hip-joint is markedly limited and painful. There are no areas of anesthesia. The knee-jerks are slightly less active on the left. The Achilles' tendon reflex is markedly diminished on the left. There is no adductor spasm and complete flexion of the thigh gives relief of pain.

Laboratory Findings: The routine laboratory examinations were normal. The reverse Queckenstedt test was normal. Total protein determination of the spinal fluid was 21 mgm. per one thousand. Lipiodol injection showed a filling defect on the left side in the lower lumbar region.

Operation: Revealed a herniation of the nucleus pulposus displacing the fifth lumbar nerve on the left side posteriorly. The nerve was hyperemic at this point. Convalescence was slow but uncomplicated.

Final Examination: Since the day after the operation, the patient has had absolutely no pain except for slight stiffness over the site of the operative wound. Examination on May 13, 1938, revealed no pain over the course of either sciatic nerve or in the back. There is some slight stiffness over the area of operation. There is no tenderness over the spine nor over the area of operation. Flexion is normal for a man of this age. There is no limitation of motion of the spine in any direction and the spine is perfectly straight; no scoliosis. Discharged, fit for duty.

Case 11.—R. E. B., U. S. Employees' Compensation Commission case, white. Admitted to the hospital July 26, 1937.

Chief Complaint: Pain and aching over the lower back.

History: This patient gave a history of injury

when lifting a heavy boat in 1932. He was suddenly taken with pain in the lower mid-lumbar region which did not radiate. He had various types of conservative treatment and, for the next two years, he performed his usual duties except for occasional backache in damp weather. In January, 1934, he suffered a similar injury and, despite heroic conservative treatment, he did not become ambulatory for three months. Similar injuries were incurred in August, 1936, and July, 1937, and in between these periods he received, in addition to medical treatment, manipulation by a chiropractor, which treatment relieved him for a few days.

Examination: Completely negative except there is some deep-pressure pain over the left buttocks in the region of the sciatic notch.

Laboratory Findings: The routine laboratory work was completely negative. Total protein was 25 mgm. per one thousand. The reverse Queckenstedt was suggestive. Lipiodol injections showed a deformity on the right side in the region of the fourth lumbar spine. The patient was discharged at this time for a period of ninety days. He returned again in March, at which time the pain had become more localized over the right buttocks and occasionally radiated down the right posterior thigh. Reexamination showed the defect that was previously observed to be still present.

Operation: Showed a very definite hypertrophy of the ligamentum flava compressing the fourth right lumbar nerve. This nerve was hyperemic.

Final Examination: Convalescence was uneventful except for slight secondary anemia, and final examination on discharge showed complete relief of all pain except stiffness over the operative site. We advised sixty days more convalescence. It is believed that this patient should get complete relief from all his previous trouble.

Case 12.—J. C. K., truck driver, white. Admitted to the hospital February 18, 1938.

Chief Complaint: Pain in lower back radiating down the left leg.

History: First occurrence of low back pain was in 1922, which continued with remissions until 1935. At this time he noticed there was a very definite radiation of the pain down his left thigh, posteriorly. He had chiropractice treatment in 1926 and some transitory improvement. The sciatic pain was first noticed only above the knee but lately goes down the posterior surface of the leg. There is no disappearance of sensation and there is no history of injury. Sneezing, coughing and straining cause radiation of the pain down the course of the left sciatic nerve. After spinal puncture here, the symptoms became somewhat aggravated. The pain is not affected by changes of weather.

Examination: The patient stands with a list to the right with loss of lumbar lordosis and a slight scoliosis of the dorsal spine. There is tenderness over the left sciatic notch. The left gluteal muscles appear relaxed and there is slight spasm of the left lumbar sacro-spinalis muscles. Anterior flexion of the spine is limited to twenty-five or thirty degrees. Measurements for atrophy or shortening were negative. Sensation was normal, no ankle clonus, no Babinski, knee jerks equal and the Achilles' tendon reflexes were equal.

Laboratory Findings: X-ray showed the fifth lumbar vertebra was sacralized by means of its left transverse process. The reverse Queckenstedt test was suggestive. The spinal fluid was grossly negative. The total protein was 30 mgm. per one thousand.

Operation: Showed a definite elevation in direct relationship with the fourth lumbar nerve root between the fourth and fifth lumbar vertebrae. There was also slight thickening of the ligamentum flava in this area.

Final Examination: Convalescence was uneventful except that the patient suffered excruciating root pain for three days but, after this subsided, he said the only discomfort he had was a slight soreness over the operative site. He was discharged on March 26, 1938, at which time examination showed only limitation of motion of the spine due to stiffness. One month later, patient was examined and found to have complete relief.

SUMMARY

These conditions are certainly worthwhile to keep in mind. Heretofore we have treated patients with low back pain and sciatica for months and have had them return often with exacerbation of symptoms. We feel that conservative treatment should be given a trial but not too long as most of these patients are laborers and their financial condition will not allow long periods of treatment. It has been observed, especially when they are having financial trouble, that a large psychic element intervenes and it may

lead one to label the cases as neurotics or malingerers.

The outstanding subjective symptoms may or may not be the history of minor injury, such as fall on buttocks or repeated discomfort in back while lifting in bent-over position which suddenly becomes severe and radiates down one leg or the other. This may come on at once or there may be a latent period. Another common subjective complaint is numbness in some part of the extremity. The common objective findings are the straight lumbar spine, pain elicited on forward bending, positive Kernig sign, atrophy of thigh, loss or diminished Achilles' tendon reflex and tenderness over the sciatic notch.

The post-operative results are most gratifying in these cases and the patients themselves marvel at their sudden relief of pain. All of our cases have had complete relief of pain the following morning except in one instance when it was aggravated for a period of three days. It has been our practice to keep these patients in bed for ten to fourteen days on an air mattress. Their activity is not limited and they are encouraged to move about in bed. Following this, they are given daily salt baths for five days and started on exercises to remove the residual stiffness in the lower back. They are then discharged from the hospital to return to duty in sixty days and are advised to return before the end of this period for final check. All of our cases have returned to duty except in two instances.

Within the last six months we have operated on sixteen cases, these being in a general hospital averaging approximately 400 patients, so you can see that the condition is probably more common than expected. On the other hand, we see many cases of low back pain and, if a check is made, it is our opinion that the percentage falling into this group would be small. We feel it is not necessary to inject lipiodol promiscuously into the spinal canal. To make the diagnosis, a careful history and physical examination will usually suffice, finally to be proved by lipiodol injection. We have injected eighteen cases for this condition and have found lesions in sixteen which were proven at operation. We have had no case in which there was any complication from the spinal injection of lipiodol and, although we have tried air and other substances, we are not able to confirm their value in this condition at the present time.

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BODY WEIGHT AND HEMOGLOBIN CONCENTRATION.

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INTRODUCTION

The normal range of blood-hemoglobin concentration depends to some extent on age, sex, climate, and certain physiological conditions. There are other factors which influence the hemoglobin concentration, but these are the ones usually considered by investigators attempting to establish normal hemoglobin standards.

Only a few investigators have considered the possibility that hemoglobin concentration may be dependent on body size. Wintrobe (1930) has treated data on normal men and women statistically; he found only a slight positive correlation between hemoglobin concentration and body size. Powers and co-workers (1930), in reporting hemoglobin values on dogs, divided their animals into three groups according to body weight; the average hemoglobin values increased with the average weights of the groups. Rosahn and co-workers (1934) have remarked that the hemoglobin values in their heavier breeds of rabbits were lower than in their smaller breeds of rabbits. Because of the scarcity of reports, I considered this subject worth further investigation.

This paper deals with the relation of body weights to hemoglobin concentration in men and rabbits.

EXPERIMENTAL

The men used in this investigation were students enrolled in the pharmacy, dental, or medical schools. The rabbits used were of two breeds—Himalayan and an albino type of rabbit obtained locally.

The weight of the rabbits, and the height and weight (both without shoes) of the men, were taken. Two kilograms were deducted from the weight of

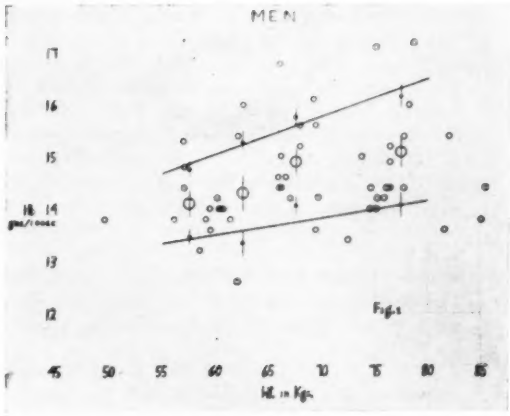

Fig. 1.—Hemoglobin concentration is plotted against body weight (small circles). The large circles represent the mean values of each of the classes (see text). The points above and below each mean value represent the mean plus and minus the standard deviation, respectively. The fine vertical lines represent the standard errors of these values.

each man as correction for the weight of clothing.

The blood samples were obtained from freely-flowing finger punctures in the case of man; the first drop was always discarded because of possible dilution by the tissue fluid. With the rabbits the blood samples were obtained from the ear veins.

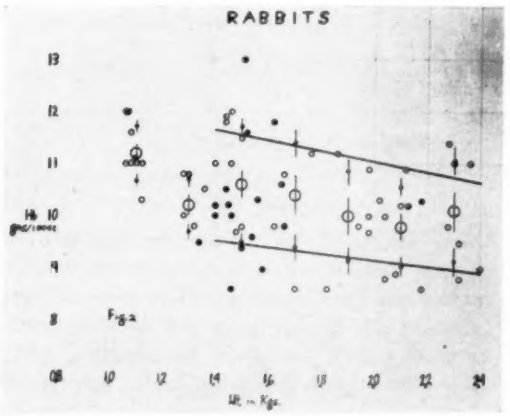

Fig. 2.—This figure is constructed in the same manner as Fig. 1. The hemoglobin values obtained on the albino rabbits are indicated by small circles; those on the Himalayan rabbits, by solid circles.

Hemoglobin determinations were made with a Sahli hemoglobinometer. Calibration by means of blood oxygen determination using the Van Slyke apparatus gave the following results: The average of six readings with the Sahli instrument on a sample of blood was 15.6 gms./100 cc.; the average of two readings with the Van Slyke apparatus showed the sample to contain 15.5 gms./100 cc. The Sahli instrument was therefore assumed to give true readings.

RESULTS

Figures 1 and 2 show the hemoglobin values of the men and rabbits plotted against their body weights. Also certain statistical values are shown in these figures. These were obtained by grouping into classes the values lying between each five kilogram range of weight for the men or between each 200 gram range of weight for the rabbits. For each of these classes the mean values of hemoglobin are indicated by large circles. The standard deviations are indicated above and below the mean values by small solid circles. The fine vertical lines drawn through the mean values and also through the points indicating the standard deviation represent the standard errors of these values. The heavy lines through the points representing the standard deviation were drawn from observational equations calculated to fit these points.

DISCUSSION

Reference to the figures shows that there is a wide scatter of hemoglobin values at any given weight; hence the hemoglobin concentration itself should not be considered as a true function of the body weight. Evidently at any given weight there exists a distribution of hemoglobin concentrations. And it is in the possibility that this distribution of hemoglobin values varies with body size that we are interested.

In any distribution, various values can be used as a measure of that distribution. The mean value, for example, could be used; however, this has the drawback that it gives no information about the shape of the distribution curve. In order to have values which would fix both the position and shape of the curves I have used the mean plus the standard deviation, and the mean minus the standard deviation as values with which to correlate body weight. It is through these points that I have drawn lines from calculated observational equations.

In the case of man (see Fig. 1) lines drawn through the values for the mean plus one standard deviation and through the values for the mean minus one standard deviation, both show a positive slope. That is, the region of distribution of normal hemoglobin values shifts toward higher concentrations as the body weight increases. (It is to be noted that no statistical values are given for the class comprising

body weights between 70 and 75 kilograms; the numbers of subjects falling in this range are apparently too few to have any great significance.)

Before considering the relationship suggested in the case of rabbits, it should be pointed out that not all of the data shown are included in the analysis. The data on rabbits weighing less than 1.4 kilograms are shown in the figure, but these values were not included when the observational equations were calculated. The rabbits below 1.2 kilograms were definitely immature; those between 1.2 and 1.4 kilograms were border-line cases. Because the blood picture of adult and immature animals is in general considerably different, I was uncertain as to the justification of including these in the analysis. I have plotted them in the figure as a matter of record. Also it should be pointed out that although the majority of the animals included in Figure 2 were males, females were also included; for the weight of evidence in the literature suggests only a slight or possibly no difference between the sexes of rabbits in regard to their hemoglobin values.

The relationship shown in the case of rabbits is the reverse of that for man; the region of distribution of normal hemoglobin values appears to decrease as body weight increases.

My findings for both men and rabbits receive support from the literature which I have mentioned in the introduction. There remains for consideration the possible significance of this relationship that I have found. Without accurate knowledge of all the factors responsible for fixing hemoglobin concentration at any given body size, it is difficult to give any clear statement. Probably several of these factors vary with body size; and it is therefore not surprising that hemoglobin concentration also varies with body size. Probably no greater significance should be attributed to this relationship at the present time.

SUMMARY

1. Data are presented to show that the range of normal hemoglobin concentration varies with body weight in both men and rabbits.
2. The findings are briefly discussed.

NOTE: I am indebted to Miss M. K. Cary for the Van Slyke determinations.

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ANOMALIES OF THE FEMALE GENERATIVE ORGANS—WITH REPORT OF A RATHER REMARKABLE CASE.

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In order to give color to the report of this case it seems pertinent to give a bit of history on these conditions.

The uterus and vagina are formed by union of Müllerian ducts, from below upwards.

Failure of fusion of the Müllerian ducts leads to conditions which very much complicate labor.

The fused portions of the Müllerian ducts form the uterus and about four-fifths of the vagina.

The cervix at first grows much faster than the uterus, so that at birth it comprises at least two-thirds of the entire uterus. Even at the eighth month of fetal life the cervix is about three times the size of the uterus.

There are a large number of case reports on congenital anomalies of the female genitalia. All congenital anomalies of the genital tract are due to malformation. One of the most frequent is double uterus. It is stated on authority that some anomaly of the genital tract occurs in about 1 per cent of all cases. The extent of abnormality depends on the degree of failure of fusion of the Müllerian ducts. When the walls between the two ducts remain completely intact there results a double uterus, double cervix and double vagina; this is known as *uterus didelphys*, or bicornate uterus. When there is an arrest of development of the uterine portion of one duct the condition is called uterus unicornus. It is be-

lieved now that the condition is much more frequent than was supposed.

But one thing is certain: These congenital abnormalities are the cause of very serious consequences in both mother and child, and should be carefully looked for by the obstetrician. When there is a patulous or permeable Fallopian tube and healthy functioning ovary, although a small uterus, pregnancy may occur and go on to successful fruition. And right here let me cite a case of mine:

A young woman about eighteen who was suffering from dysmenorrhea and poorly developed external genitalia, came to me for relief. I dilated the vagina and cervix. Finding the uterus very small, I went in the abdomen and found the ovaries healthy and well developed, as were also the Fallopian tubes. I did nothing with them, but told the little girl on discharging her that I did not think she would ever bear any children. She seemed to be sorrowful and left the office, but answered me in two years or less by giving birth normally to twin boys.

It is believed by Palmer Findley that women with uterus didelphys are usually fertile, and may menstruate during pregnancy—and I venture to say that this menstruation may be coming from the non-impregnated side of the double uterus.

The two halves of a bicornate uterus are not usually symmetrical. Menstruation may come from both uteri simultaneously, but sometimes from only one at a time. Pregnancy may occur in one or both horns; and twin pregnancy has been known to occur in one horn. The question of pregnancy occurring in the two horns at the same time or at different times is open to controversy. Usually pregnancy occurring in one horn goes on undisturbed. The other horn grows and develops a decidua similar to ectopic pregnancy, this decidua being cast out while pregnancy goes on in the other side. The course of the case resembles an abortion, and may lead to a curettement of the pregnant side unless the true condition is known. This was evidently done in the case I will report. Usually, however, the decidua comes away with the lochia. There are, however, cases recorded where, as I have suggested, one side menstruates normally while pregnancy goes on undisturbed in the other. It is claimed that pregnancy in one horn may precede that in the other by weeks or months. In fact, a double uterus may sometimes, I think, explain the case of a superfetation.

A very small per cent of pregnancies in uterus didelphys go to term and are believed to be the cause of inertia, postpartum hemorrhage, retention of the placenta and even rupture of the uterus.

The danger to the child is always great, being frequently born dead. Cesarean section has been performed in many cases and indeed seems to be the most humane treatment. Many cases are reported in which abortions have occurred on one side, curettement having been done without disturbing the other side. There is one case on record where a spontaneous delivery occurred on one side forty days before the baby in the other side was delivered, mother and both babies lived. No milk was secreted after the first child, but after the second child was born she secreted much milk—enough for both babies.

I will now report my case which was one of uterus bicornus duplex—that is, a double uterus with two separate horns fused at the cervix, about the level of the internal os, but with two separate cervical openings and a double vagina or septum.

Mrs. G. A. B., twenty-one years old, a native of North Carolina, who had lived in this vicinity over one year, consulted me March 4, 1938. She was small, but fairly healthy looking, and said she felt pretty good; weight 126; heart-beat 112 but regular and no murmurs; blood pressure 122 over 80; urine normal, and her bowels were regular. Slept poorly but had no nausea; and her appetite was good. Date of last menstruation August 24, 1937. External measurements were: Interspinous 20; intercristal 26; bi-trochanteric 32; external conjugate (Baudelocque) 19 cm.

Past History: Menstruation free but otherwise normal. Had a miscarriage one year ago; was very sick, and was curetted at Old Point by a naval surgeon, who told her she had a double uterus—she was six weeks pregnant.

History of Present Pregnancy: Had much nausea during first months; went to St. Vincent's Hospital and took the "rabbit" test. Was given corpus luteum, also glucose intravenously; finally left the hospital and went down home to her mother. She was treated by tablets of corpus luteum, and after a short time got over her nausea and had no further serious trouble. She was pretty large but had no other discomfort. I did not diagnose twins, made no vaginal examination, and she did not tell me a thing about having two vaginas, although told to do so by both the naval surgeon and Dr. W. L. Taylor, of Virginia Beach, who treated her for nausea in the early

months. When she was at the office March 28, urine was normal; weight 133; had some pain in back and a feeling of general discomfort; but nothing serious. She came back April 13, suffering with a constant pain in abdomen and back, with some nausea and vomiting; urine was normal, and blood pressure was 140/90. I sent her home and to bed and gave her codeine. She slept well all night without pain but was still very tender in left lower quadrant of abdomen which was hard and tonicly contracted and was bulging very much towards the left—rounded and hard. Rectal examination revealed a soft mass which was tender; cervix was dilated slightly and soft. I then diagnosed twins with possibly a double (or bicornate) uterus. Blood pressure was then 160/100; urine negative; pain was constant, i.e., not intermittent; nausea was better. I sent her at once to the hospital and tried to get an X-ray but the symptoms became so violent I was afraid of a ruptured uterus so decided to perform a Cesarean section and had her prepared at once.

Examination, abdominal and rectal, showed there were two babies in there, the one on the left being a breech, the one on the right a vertex; fetal sounds were plainly heard on both sides. The baby on the left side was a frank breech and in anterior position, and the os was dilated two fingers. She was thoroughly prepared under anesthesia; and after she was thoroughly relaxed, vaginal examination confirmed the diagnosis, i.e., double vagina, double uterus with a living baby in each side, seven and one-half months intra-utero gestation. The os through the left vagina was dilated three fingers, and was soft; the membranes had ruptured and the cord was prolapsed but pulsating. The os through the right vagina was dilated only large enough to introduce the tip end of the index finger. I could feel the bag of water bulging and the head, but there did not seem to be any contraction of this side.

I then did the classical Cesarean section, opening the left side first and extracting by his feet a boy weighing four pounds five ounces; there was not much bleeding; but for fear of bleeding and fearing to give pituitrin on account of the danger to the other baby, I opened the right side by parallel incision and delivered the baby from this side, weight four pounds two ounces. Pituitrin was then given and in a few minutes the placentas came away by the Duncan method. Transfusion was given of 500 cc. of previously matched blood. Bleeding was of small consequence. The incisions in the uterus were closed with chromic catgut and the operation completed in the usual way. Babies were resuscitated easily, cried lustily, and the mother went on to recovery with only a little temperature the second and third day. She had little or no milk, however, and the babies were so small and weak—being six weeks premature—that no attempt was made to have her nurse them. After a few days quiescence they began to gain—though they were kept at the hospital three weeeks after the mother had gone home. Each weighed five pounds and eleven ounces and gained even faster after going home, the mother taking great pains with them, and being very proud of her accomplishment.

I have a supplemental report to make on this case, which, though I somewhat regret the necessity for it, yet the patient was very grateful.

Although I did not have the consent of the woman to sterilize her, yet thinking it wise, and knowing she would give her consent, I crushed and ligated both tubes with No. 2 chromic catgut. After she recovered from the operation a month or six weeks she asked me what precautions should she take to prevent becoming pregnant again, that she did not want to have any more children if she could avoid it. Then I told her what I had done, and I did not think she need take any precautions for some months to come, if ever. She took me at my word. She menstruated from the first, and in about four or four and one-half months was pregnant again. She was, however, toxic from the first and there was no let up. Corpus luteum, liver extract intra-muscularly, glucose intravenously, diet, drugs, all were tried, and still she vomited. She was so depressed she swore she was going to start something herself if something was not done for her. I consulted with two of my confreres and all concluded it best to perform a therapeutic abortion and sterilize her at the same time. She was about two months pregnant. I went in the abdomen October 12, 1938, found one side of the uterus larger than the other—the right—which I incised and curetted out the contents. Then by running my finger down into the cervix, I found that the two sides of the uterus fused within the cervix. I had found this out, however, before she became pregnant. I found the left side was also pregnant, though not as far advanced as the larger side. So by splitting up the septum a distance of an inch I easily curetted this side. I then ligated, cut, and buried the ends of the tubes and finished the operation in the usual way.

She had no trouble and is now in good health.

I will report two more cases occurring within the last month which might be considered anomalous. One was a second Cesarean on a woman who two years or more ago was sectioned for having a uterus that would make no effort to expel its contents after going three weeks over time. A low section—transperitoneal—was performed, and a large normal baby delivered. The same thing occurred this time; the woman would *not* go into labor; the head was jammed down in the pelvis but would not budge. I sectioned her the second time, doing the classical operation on account of adhesions.

On November 16 I performed Cesarean section on a woman—second pregnancy—this time twins, both babies in the breech presentation.

She had the following history: Her father had dorsal Pott's when a young boy; she herself had pulmonary tuberculosis and had been to Catawba Sanatorium (eight years ago); she had an abortion in January, 1938, and became pregnant again immediately afterwards, suffering a great deal the whole nine months following. Her pulse was over 100, but she had no fever. X-ray showed twins, both being in the breech presentations; the one on the left—a frank breech in the left sacro-anterior position—seemed to be jammed down in the pelvis, but there was no dilatation of the cervix and the woman had no pains, i.e., labor pains. With the history of her weakened condition, and pulse becoming more rapid, we concluded a Cesarean section was advisable and did a classical operation November 16; the mother and twins all did nicely and returned home from the hospital November 27.

A great many anomalous cases are seen in the gynecologic clinic at St. Vincent's Hospital—reaching over a period of about forty years; but they would add very little to our knowledge, being mostly of the same type as reported in the standard textbooks and journals.

256 Granby Street.

PRELIMINARY REPORT ON DR. ALEXANDER FINIKOFF'S TREATMENT FOR SURGICAL TUBERCULOSIS—WITH A SUMMARY OF 14 CASES.*

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While in Paris during the summer of 1935, I heard of a Dr. Alexander Finikoff, a Russian physician exiled there, who it was reported was treating cases of surgical tuberculosis and showing a record, covering several hundred cases over a number of years, of 80 per cent of recoveries. By recovery was meant arresting of the tuberculous infection, reproduction of new bone, with a complete or nearly complete restoration of function in the affected joints. Frankly, I did not believe this. Through a mutual acquaintance, I met Dr. Finikoff. I was impressed by his simplicity and sincerity, his knowledge of tuberculosis in general, and by certain rather unique specific theories concerning this disease which varied somewhat radically with our own theories. I read his recently published work, which had been presented to the Paris Academy by Prof. Delbet, the well known French Surgeon. Several days were spent going over hundreds of roentgenograms, taken before and after treatment, that showed extraordinary changes in the bones and joints involved. Still skeptical, but with stimulated interest, I remained several weeks with him in his clinics in various hospitals in Paris. Doctor Finikoff is a scientist in the true sense. He has spent many years in experimental work in Russia, later in Paris, where he had an uphill battle to win recognition and support from the surgeons in the profession. He has distinctly won their support under the most adverse circumstances on his results alone. I saw what he was accomplishing and could not help but share his enthusiasm.

Many physicians in the past have offered many so-called "cures" for all types of tuberculosis but no one but the authors have been able to obtain comparable results. I found, by contrast, that other men in France, Russia, Spain and Italy were reporting equally as good results as Finikoff in using his method of treatment. I saw grateful patients with all types of tuberculous joints, hips, Pott's, Charcot's, fistulae, all classes economically, traveling long dis-

*Read before the Seaboard Medical Association of Virginia and North Carolina at Greenville, N. C., December 6-8, 1938.

tances by bus and subway, under their own power, returning regularly for these treatments. They were invariably happy, enthusiastic and grateful for what he was accomplishing in their restoration to normal life. They were improving. This they could see for themselves. Some were almost totally recovered. I saw others entirely well, old sinuses healed and joints with 70 to 90 per cent normal function.

The essential component parts of his method are not new in any sense, nor does the method itself strongly stir the imagination, but Dr. Finikoff, through years of preliminary work, has succeeded in standardizing the technique and dosage in a manner that renders it available to any physician, whether specialist or general practitioner, urban or rural.

The method is based on the results of the work of Henriot, Bergel, Noel Fiessinger, P. L. Marie, Bartel, Roger and Binet, on the lipolytic action of the organs and on the experiments of Professor Metalnikoff on the part played by the lipase in the fight against tuberculosis.

The works of Ramond and of Poulain, of Roger and Binet, of Claude, of Gougerot, of Fiessinger and Marie and of Keyes enabled Dr. Finikoff to proceed to his laboratory and clinical experiments with the treatment by intramuscular or subcutaneous injections of iodized oil, i.e., highly refined and sterilized special vegetable (neutral) oil to which has been added immediately before use a 10 per cent solution of iodine.

The proteolytic action of iodine having been known for a long time past, the researches of Fr. Muller, of E. Fischer, of Abderhalden and those of Eug. Opie and Bertha Burner, of Muller, of Jochmann and of Hedin, as well as personal clinical observations of long duration, decided Dr. Finikoff to combine the injections of oil with iodine in order to increase the very low polynucleosis found in tuberculous subjects, as this would enable the organism to digest the albuminoid substances of the tubercle bacillus.

It is well known, but not generally admitted, how inadequate are the classical methods of treating surgical tuberculosis. It is exceptional for the conservative treatments, such as immobilization, climatotherapy, and thalassotherapy to end in a cure in severe cases and in adults.

Operative treatement, the most widely used, involves great risks such as the formation of obstinate fistulae, the reviving of latent foci, the spreading of the infection and the exacerbation of the condition by the shock of the operation. It is, in fact, only a last resource, for it does not cure—it mutilates. There are no drugs of any known proven value. The maximum result procured from immobilization is never more than complete ankylosis and not ideal as far as function is concerned.

The theoretical and experimental basis of the Finikoff method rests on his scientific researches on tuberculosis and the experimental and clinical data of recent years. Dr. Finikoff reasons that the external forms of tuberculosis are local manifestations of a general infection which must be attacked in order to achieve positive results. He considers of prime importance his—

1. Studies of the biologic state of the tuberculous soil, and

2. Studies of the immunity against tuberculosis, which is very special and quite relative and for which he has created new terms—compensation and decompensation of the bacillary lesions.

He has made studies upon the concentration in the blood of lipase and the leucocyte formulae in normal persons, in progressive pulmonary types, and in those with surgical tuberculosis, both before and after treatment. His tabulated results[22] indicate the importance of the blood lipase and the leucocytes in the "cure" of tuberculosis.

The objective of his treatment is the "compensation" (referred to above) of the bacillary lesions by the cytophylactic and biological means of stimulating the defense mechanism of the body.

He describes or defines these defense forces as follows:

1. The lipolytic property of the blood and lymphatics due to the lipodieretic ferment, the lipase, that splits the waxy envelope of the bacillus of Koch.

2. The proteolytic property of the blood due to polynucleosis which enables it to digest or neutralize the protein and albuminoid substances of the tubercle bacillus.

3. The re-mineralizing property of the body, which consists in neutralizing with the blood calcium the fatty acids released by the disintegration of the waxy envelope, and the complex toxins of the tubercle bacillus, as well as to compensate the lesions by recalcifying them. He maintains that calcium's principal action is detoxication, and stresses the importance of its use in any and all forms of the disease, continuing long after the clinical cure.

The Finikoff treatment, therefore, consists in:

1. Increasing the quantity of lipase and the monocytosis by intra-muscular injections of special absorbable vegetable oil.

2. Stimulating the polynucleosis by the addition of iodine in minimal doses sufficient to be leucocytogenic without being harmful.

3. Re-calcifying or detoxicating the organism (human body) with calcium salts in order to prevent the intoxication by the fatty acids and the demineralization.

(NOTE: 1 and 2 must be specially and freshly mixed each time immediately before the injection, or it would not be absorbed.)

The course of the disease during treatment follows definite changes by stages, the effects being noted fairly rapidly.

1. The state of detoxication marked by improvement in the general condition.

2. The congestive stage during which there is increased suppuration from fistulae if these exist or a sensation of heaviness at local foci.

3. A stationary stage, and,

4. Stage of improvement when local foci show definite changes for the better and fistulae begin to dry up and close.

Dr. Finikoff uses immobilization or extension as an adjuvant and only very temporarily to relieve severe pain in the acute stages of the osteo-articular types. One must remember that the ultimate objective with this method is recovery *with function, and not ankylosis.*

The duration of the treatment depends upon the gravity of the lesions, the general condition of the patients, and their ages. A general average of all cases of record so far is about seven months. Being simple and harmless, it can be applied under all conditions and to all classes of patients. The results are constant and just as good in serious adult cases as in incipient ones in children. It is specifically contra-indicated in advanced pulmonary and visceral tuberculosis, in cachexia, deficiency of the liver and kidneys, bacillary septicemia and meningitis.

Dr. Finikoff stresses the importance of calcium therapy, both intravenous and *per os,* and strongly recommends its continuation by mouth long after the clinical cure is established—for he finds that the phenomenon of re-calcification of the lesions does not show in the X-ray films until well after the clinical recovery.

The technique, briefly, is as follows:

Intra-muscular injections of iodized oil. The site of preference is into the gluteal muscles. There is a burning pain lasting from thirty to sixty seconds, diminishing rapidly during two to three hours to a soreness. The two ampules are emptied into a sterile medicine glass and then thoroughly mixed by pumping twenty to thirty times with the 10 cc. syringe. I use a rather large intra-muscular needle, short beveled, and not too sharp. The usual precautions for oily injections must be observed. Personally, I always disconnect the needle from the syringe after the insertion and if blood is noted in the needle, it is re-inserted. This is done to prevent an oil embolus, the only danger from the treatment. The dose varies from one to 15 cc., and must, of course, be decided by the clinician.

It is recommended that in severe cases a course of intra-venous injections of calcium chloride precede the iodized oil. About three injections a week for four weeks should be given, this to be repeated several times with six weeks' intervals. The initial injection should be 3 cc., the second 6 cc., and 10 cc. afterwards. Caution should be observed as sometimes one gets rather severe reactions with intravenous calcium. It should never be used in children or the extremely debilitated.

Calcium by mouth such as the gluconate or tricalcine, a French preparation of merit, and all adjuvants such as cod-liver oil, proper diet, rest, etc., are advocated. Only two of my cases were suitable for intravenous calcium. The diet should be rich in proteins, fats and calcium.

I wish to submit brief reports on fourteen cases treated by me since 1936. They are not all tuberculous but they are all difficult of treatment. You will note that four of these cases are rheumatoid arthritis. Finikoff privately believes, but does not attempt to prove, that an underlying tuberculosis is the possible causative factor in certain of these arthritics. It cannot be demonstrated, but as far as I know, this theory may be as good as any other. In other cases my diagnosis can and may be questioned, but I vouch for the results, and, after all, results are mighty important to those of us engaged in practice and not purely theoretical and experimental medicine. Negative Wassermanns were obtained on all cases, but unfortunately the X-ray was not available. Dr. Finikoff is at present experimenting with his treatment in pulmonary types, and is optimistic, but

does not yet recommend its general use in these cases. Any one who is careful in pulmonary diagnosis, and willing to assume slight hazards, may use it guardedly by reducing the amount of iodine content in each dose.

bone of the nose upward to within 1/2 cm. of the upper edge of the lower eyelids, downward involving the entire upper lip in severe ulceration with destruction of lip tissue. Marked swelling of all cervical, submaxillary and sublingual glands. At the

CASE No. 1.

A—M. V. T., colored female, age eight years. Lupus of face. Photo made February 18, 1936, after fourth injection of iodized oil. Much improvement already noted.
B—October 21, 1936, after thirty-five injections of iodized oil. Note the general healing except small ulcer, right eye.
C—April 14, 1937. All white areas are healed lesions. Only existing ulcerations are around end of nose, which shows a regrowth of 2½ cm. Child considered recovered since December but treatments continued because of the nasal reproduction.
D—November 9, 1938. Scar on cornea from ulcer has disappeared completely. No recurrence. No other treatment except iodized oil. Nose normal in length except septum, which has lagged slightly behind the rest. Pigmentation of the skin has even returned. The roughness at end of nose I believe is a regenerative process and not degenerative. C.H.D.

Case 1. M. V. T., colored, age eight, female. Lupus of face. Economic status—very poor. First seen on February 18, 1936. Extremely emaciated, physical condition poor, with a violent lupus of the face reaching the inner canthi of both eyes, and extending laterally over both cheeks almost to the ears. Total destruction of the skin, cartilage and

time of the fourth injection, such marked improvement in the lesion was noted that a photograph was made on March 18. This child received weekly intra-muscular injections of the Finikoff iodized oil with a limited amount of tricalcine by mouth. The dose of iodized oil varied from 1 to 3 cc., according to reaction obtained. No other treatment was given

until the lesion was healed, when the child was given cod-liver oil furnished by the Suffolk Health Department and this irregularly. By December 24 (ten months) the lesion had practically recovered, all glands were normal and the child had made a regular gain in weight of twelve pounds. The treatments are being continued because of an extremely interesting phenomenon noted. In March or April, 1937, a progressive prolongation of the nose was observed. This has continued to the present time with a prolongation of more than 2½ cm., including bone and cartilage. The natural pigmentation of the skin is returning.

(NOTE: This child was brought twenty miles by friends and has missed but four or five weekly trips. No cooperation in nutrition or hygiene.—Recovered.)

Case 2. J. de L., colored, male, age thirty-two. Four T. B. Fistulae peroneal and one of the rt. epididymis. Economic status—poor. Condition—hopeless.

Received eight intra-muscular injections of the Finikoff iodized oil, 6 cc. each, one week apart, the last on December 10, 1935. On December 20, the patient developed an intercurrent meningitis and died December 25. A large framed man, bed patient for over four years, weight less than eighty pounds when I saw him. Could see no possible connection between the treatment and the cause of death.

At time of sixth injection, marked decrease in discharge was noted from sinuses. Although death occurred, improvement was noted locally.

Case 3. C. R., colored, age six years, female. T. B. right knee and shoulder; osteomyelitis, right tibia. Economic status—very poor.

Patient became ill twelve months previously. When first seen entire right leg was in plaster. A discharging T. B. sinus from right shoulder; emaciated; temperature 101; acutely ill. Ten weekly intramuscular injections of iodized oil were given in the left hip. Patient greatly improved with very little discharge from shoulder sinus. Because of bad roads in winter and lack of transportation, patient failed to appear for further treatments.

Results—Improved. This patient was unable to take calcium by mouth.

Case 4. W. A., colored, age thirty-four, male. Economic status—fair. Cooperation—fair.

Three ano-rectal tuberculous fistulae, with profuse discharge onto the perineal floor. Extreme emaciation; bed patient for last four years. When first seen was developing acid colitis (a literal translation of French term, indicating continuous, persistent, sour stools, food passing quickly, undigested). Prognosis hopeless. Treatment began on August 12, 1936, with 1 cc. iodized oil into the hip. Increased 1 cc. each week until the dose reached 5 cc.; then dropped down to 3 cc. Total of thirteen injections given. Considered too debilitated for intravenous calcium, but calcium gluconate given by mouth, also tricalcine. Diet regulated, anti-acid, but the acid colitis became steadily worse, ending in death November 17, 1936.

Even so, after the sixth injection, the fistulae began to dry up and were discharging practically nothing on November 11.

Case 5. C. C., colored, age twenty-five, female. Economic status—very bad. Insufficient food at all times.

Tuberculous fistulae over each kidney. Seven months previously, large cold abscess over left hip, region kidney, opened by colored physician. Never healed, leaving discharging sinus. Later similar sinus developed same location right kidney. Treatment began October 14, 1936, with 1 cc. iodized oil, increased weekly to 4 cc. Total of ten injections given. After fifth injection patient complained no more of pain. Sinuses completely dried up on December 30, 1936. Because of extreme difficulty of getting to clinic on foot in very bad winter, was given a rest, but put on calcium gluconate and tricalcine, and told to come back if she had any more trouble. Reported October 30, 1937 condition good. —Recovered.

Case 6. G. P., colored, male, age twenty-two. Economic status—good. Cooperation—excellent.

T. B. abscess involving upper portion sternum. Discharging copiously through sinuses at two openings on chest. Treatment began with 3 cc. calcium chloride 10 per cent, then 10 cc. every other day for five injections. Then iodized oil intra-muscularly began on July 31, 1937, dose 3 cc. for three weeks, then increased to 5 cc. Last injection October 13, 1937. No more discharge from sinuses. Reported back February 16, 1938.—Recovered.

Case 7. M. H., colored, female, age six. Economic status—very poor. T. B. cervical glands, lt., purulent discharge (had been opened by physician early).

First developed July, 1937. First treatment November 11, 1937. One cc. iodized oil, weekly inter-

vals. Tricalcine *per os*. Discharged May 2, 1938. Considered recovered since March 9, 1938. Fifteen treatments. Treatments continued to produce increase in weight. Child showed consistent gain. Results—recovered.

Case 8. E. M., white, female, age thirty-five, married. Economic status—good. Cooperation—extremely poor.

First seen December 30, 1935. Diagnosis—T. B. mesenteric lymph nodes, fecal fistula through the anterior abdominal wall just below umbilicus. Extremely emaciated, "shrunk" in height. Prognosis poor; had been told by others she had only few weeks to live. Weekly injections 5 cc. iodized oil beginning January 3, 1936, ending February 10, 1936. Total six injections, when treatments were discontinued because of husband's opposition, and against my advice. After the fourth treatment a most noticeable improvement was noted in local condition, the sinus closing nicely, patient's general appearance vastly improved. Commented upon by her friends. This improvement continued for many months, patient becoming ambulatory and going everywhere. She continues an active life. Very obstinately constipated, alternating with diarrhea. Obstinate mentally. Results—improved.

Case 9. Mrs. F. H., white, widow, age sixty-three; fistula in ano. Economic status—excellent. Cooperation—excellent.

Family history suspicious; closely associated in infancy and early childhood with tuberculous sister.

Six children. Menopause facile; no illness until 1934, when in February states she had an "abscess of the rectum." Same year she had a throat cold, followed by general rheumatic pains. During 1936 had another rectal abscess, followed by pains in the legs. Several abscesses in 1936, one per month, some as large as a walnut, the latest in January 1938. All ruptured spontaneously, after considerable pain and suffering. Pain through the sacrum, lower pelvis, and legs, of disabling nature. Unable to walk more than one block at a time. Teeth and tonsils removed in 1934.

Examination revealed a fistula in ano, external opening 2½ cm. ext. border anus. Internal opening high in anus. Mucosa around interior opening of somewhat unhealthy appearance, slightly grayish discoloration around reddened area. Patient very much opposed to surgical intervention. States she has had several friends who had had rectal operations with invariably bad results. Her daughter, who was operated on ten years previously for fistula, had had involuntary stools since.

Patient started on calcium gluconate and oxo-ate B; latter discontinued after one month. Injections 3 cc. iodized oil began March 10, 1937 at weekly intervals. Dose increased to 5 cc. July 28, 1937. Showed steady gradual improvement in general and local condition.

Local history after beginning treatment:

Pains in legs and lower back relieved by May 26, 1937.

Small abscess formed April 15, 1937; 2 cc. pus; ruptured April 18, 1937. This was six weeks after beginning injections. Last previous one, January 16, 1937, was size of walnut. May 6, 1937—small with ½ cc. pus.

October 14, 1937, one drop blood. Dose reduced to 4 cc. iodized oil. December 22, 1937 patient discharged at her request so that she might visit and rest from treatments in Winston-Salem, N. C. This patient has needle phobia. Returned voluntarily March 16, 1938, stating that soon after her arrival in Winston-Salem (three or four weeks) she began going back, with recurrence of some discomfort in her back. On January 27 a small abscess formed from which on January 29 she expressed one drop greenish colored pus, blood tinged, followed by stiffness of hips and legs. Treatment resumed with 4 cc., when she very promptly responded and stated she felt fine. Walks and rides great distances. No further disturbance around fistula. Treatments are being continued but it is felt there is very little danger of relapse. (While in Winston-Salem consulted proctologist who advised fisula inoperable, because of depth, and to continue iodized oil treatments). Results—recovered.

Case 10. J. W. H., white, male, age fifty-seven. Economic status—good. General hypertrophic arthritis, white swelling, left knee.

This patient had been a chronic invalid, unable to attend to any farm duties. Left knee enlarged three times normal size, doughy to touch, considerable pain. Joint function 10 per cent. "If you can get me so I can go fishing just one more time I'll be satisfied." Beginning July 14, 1936, fifteen weekly injections iodized oil given, starting 4 cc. and increasing after second week to 6 cc. Patient so much improved he stopped treatments on fifteenth injection against advice. General arthritic pains disappeared,

left knee normal in size, not painful. Patient had progressed from crutches to cane, then discarded that.

This patient returned voluntarily on May 18, 1938, stating he had been having some stiffness in joints, requesting about fifteen more treatments. His knee was same as when previous treatments discontinued with 90 per cent normal function. His general arthritis was of seven years' duration. Results —recovered 90 per cent.

Case 11. L. B., white, male, age sixty. Economic status—excellent. White swelling left knee.

Generally emaciated; teeth looked bad, but after X-ray by dentist, passed as O.K. Left knee painful; walked with difficulty by using cane and going very slowly. Poor appetite. Considerable crepitus in joint. Motion 30 per cent. Twice normal size, doughy.

Patient has received up to the present twenty-nine weekly injections of iodized oil, beginning on November 3, 1937 with 5 cc. and reducing on March 2, 1938 to 4 cc. Calcium gluconate by mouth.

Present condition, good; left knee normal in size; no pain; appetite excellent; weight increased six pounds. In March had inter-current phlebitis right int. saphenous vein, below knee. Cause unknown. Dentist to extract teeth. Results—recovered.

Case 12. G. P. K., white, male, age fifty, carpenter. Economic status—poor. Past history: sixteen years previously had inflammatory rheumatism.

November 7, 1936—claimed a straining injury on November 4, 1936, while at work. In assisting three other carpenters in placing steel beam, slipped backwards with total weight of heavy beam on his arms, straining back, knees, and hands. In bed when seen at this time; severe pain upper right lumbar region and lower right thorax posteriorly.

November 20, 1936—Continued pain in back; also inflammatory arthritis both knees, ankles, hands and wrists. Septic temperature, sweats; B. P. 155/80; urine negative. Prescription given for anti-arthritics plus intensive doses of aspirin, both plain and effervescent. Patient showed improvement but became extremely emaciated. Right knee remaining badly swollen, though external knee temperature normal. Still in bed helpless.

Began iodized oil December 10, 1936, dose 2 cc. weekly. Three courses intravenous calcium chloride 10 per cent, three injections per week, alternating weeks. Patient became ambulatory on January 1, 1937, and came to clinic for later treatments. Dose increased to 3 cc. December 23, 1936, and maintained there. Iodized oil discontinued on April 7, 1937.

February 3, 1937—Patient much improved. Complains of some stiffness in joints; no pain. Gained weight, color good, appetite excellent. March 24, 1937—Excellent condition generally, complains some discomfort right ankle. Industrial commission hearing set for April 9, 1939. This may have explained complaints at time as consulting physician's examination showed no objective symptoms. Claim for disability and compensation not allowed by commission. Patient returned to work latter part of May and has continued ever since, with no relapse. Inclined toward the rather heavy use of alcohol. Results—excellent—recovered.

In this case it would be an exaggeration to credit the Finikoff treatment with the results. My only contention is that the patient showed an astoundingly rapid improvement going on to complete recovery, a result infrequently attained with other therapy in one of the most obstinate conditions the medical profession has to deal with, only eighteen weekly injections having been made, plus the intravenous calcium, to obtain them.

Case 13. P. S., white, male, farmer, age forty-one. Economic status—good.

Rheumatic arthritis of four years' duration. Complete disability, being unable to attend to any ordinary farm or household duties. All articulations of both lower extremities affected. Prognosis bad, but Finikoff treatment offered as experiment and accepted on this condition. Tonsils removed three years previously; no results. Teeth had been X-rayed and approved by dentist. Patient first given Oxo-ate B for one month; no results. In fact, stated he was worse and in addition complained of rather severe pain in the back. Injections of iodized oil began on September 9, 1936, dose 2 cc. On October 21, 1936 patient greatly improved, and was doing farm work. Dose increased to 3 cc. and maintained at this point until December 16, 1936. Entirely recovered, enthusiastic over treatment, but felt so well he discontinued treatments against my advice. Had resumed more than normal activities and was taking on more all the time. No other therapy employed; no relapse to date.

Total injections fifteen. Results—recovered.

Case 14. H. P. R., white, male, age forty-nine, farmer. Economic status—good.

Arthritis left knee; right shoulder painful. First came to me on crutches. Severely disabled. Left knee enlarged 50 per cent. Function 25 per cent, both flexion and extension. Gave history of urethritis, gonorrheal, seven or eight years previously. Diagnosis, general hypertrophic arthritis with a possible gonorrheal infection of left knee underlying. Patient a very heavy, fat, large, florid complexioned male. Had consumed large daily doses of aspirin for years in order to obtain some rest. Placed on Oxo-ate B three weeks; no results. Also course of prontylin; no results on suspect knee. Injections iodized oil, dose 3 cc., began on June 16, 1937, and continued at weekly intervals until September 29, 1937—a total of fifteen treatments given. No other medication during this or since. Showed progressive and rapid improvement, discarding crutches for cane on or after sixth injection, and discarding cane after thirteenth treatment. Stopped treatments against advice on September 29, 1937, even though knee was normal in appearance, no pain, and function completely normal. Attends to all farm work at present and has had no relapse. Results—recovered.

CONCLUSIONS

The number of cases presented here is inadequate for one to form a definite conclusion regarding the efficacy of the treatment. However, there is a considerable variety, and the results do conform to Finikoff's and others' claims.

Total cases	14 (7 white—7 colored; ages 6 to 60)
Recovered	10
Improved	2
Death	2

(The two fatalities were expected, as may be noted from the case histories, but the fistulae in each case showed marked improvement. The treatment was given for this purpose only).

My impressions of the treatment, in some instances confirming Dr. Finikoff's conclusions, are:

1. It is based upon established scientific principles and is not purely empirical in character.

2. It attacks the bacillary infection of the body in general, and not its local manifestions.

3. It fights tuberculosis by stimulating the natural defense forces of the body.

4. From the clinical point of view the treatment is applicable to all forms of bone and joint tuberculosis, and to patients of all ages. It produces results in advanced cases in adults as well as incipient cases in children.

5. It is self-sufficient without complicated adjuvant measures.

6. Its action is rapid, the cure, when obtained, being produced in a relatively short space of time. This is of great clinical and social importance.

7. It lends itself to an exact dosage and always produces the same and constant effect. Yet it is flexible enough to be adaptable to all cases, enabling the clinician to individualize it.

8. It is harmless and does not expose the patient to unnecessary risks. It seems to improve the general condition of the tuberculous patient.

My individual experience convinces me that the treatment is simple, harmless and easy to apply under any and all circumstances.

It enables the average physician to do something for a great class of patients where he has been particularly helpless, his only recourse having been to refer these patients to the orthopedic surgeon. Incidentally, and not of minor importance, it aids in building up a rapidly diminishing practice. It offers a better than average chance (75 to 80 per cent) of improving these cases. When improvement is obtained, the articulation resumes a normal or nearly normal function, without ankylosis.

The results appear rapidly in tuberculous glands and in discharging tuberculous sinuses. They are even more spectacular in certain types of dry rheumatoid arthritis.

The patients are soon conscious of an increased sense of well being and are encouraged. They invariably continue what may be a long drawn out course of treatment. There is a constant increase of appetite and weight. I know of no other therapy that might have given as good results as these noted above. In the rheumatoid arthritis, I resorted to it more or less in desperation and because Finikoff had told me personally of striking results obtained by him in some of these cases.

My clinical field necessarily being limited, it is hoped this brief report may induce others to try the treatment. I can wholeheartedly recommend it.

SPECIAL INFORMATION IN REGARD TO REACTIONS

Repeated methodically every five to eight days in the gluteal muscles, the injections of iodized oil produce a moderate reaction. It is useless to give them more frequently as the percentage of lipase in the blood does not drop before the sixth day. The temperature rises from one to two degrees F. and the general state of the patient during the first twenty-

four hours is not quite so good as usual. At the site of the injection there is a burning sensation lasting from one to three hours, but severe for only a few minutes. For four or five days there is visible a small induration which disappears of its own accord.

At the focus the reaction is more marked. If there is a fistula, it suppurates more; if the focus is closed, it increases in size and gives a sensation of uneasiness and heaviness. All this does not last for very long; at the end of two or three days, everything returns to the normal state. The subsequent injections provoke weaker reactions, but it is not till near the end of the treatment that they begin to be absent altogether.

Sometimes the first injections give such feeble reactions that they pass unnoticed. The dose of iodized oil must then be increased.

In cases where the rise in temperature exceeds two degrees F., revert to the previous dosage, or even decrease it if the patient's weight does not continue to increase.

Dr. Finikoff has proved definitely in his clinics that the treatment increases the lipase from two and one-half to eighteen or twenty units.[22] The leucocytes increase seven to twelve thousand with a 25 to 50 per cent rise in the monocytes, depending on the length of time the treatment has been administered. There is a corresponding eosinophilia up to 10 per cent. This has been corroborated by Shilling, Richard and Arneth.

The oil increases the lipase and monocytes, which rise together. The iodine produces a strong initial polynucleosis followed by an even stronger mononucleosis.

This effect is noted constantly where improvement takes place and, conversely, where there is no improvement, there is no change in the blood picture. This is so definitely proven that blood examinations are not necessary for the treatment, though, when available, they are interesting.

For those having laboratory facilities and who are ultra-scientific, the following blood pictures are given as a guide to the "Mode d' émploi";

1. Picture of Resistance—
   Mild leucocytosis, not over 10,000.
   Fairly strong monocytosis, with mild eosinophilia 2-4 per cent.
   Temp. not over 37.5 C. axillary.
   Kidneys and heart normal.
   All three agents in large doses.
2. Picture of Defense—
   Leucocytosis 10-15,000.
   Polymorphonuclears increased.
   Mononuclears increased with decrease in eosinophiles and lymphocytes.
   Temp. not over 38.5 C. axillary. Patent's general condition bad with weakness and anorexia but not cachectic.
   Iodized oil in reduced dosage.
   Calcium increased, both intravenously and by mouth.
3. Picture of Destruction or Decline (Decheance)
   Hyper-leucocytosis 16-20,000.
   Polys 90 per cent—Mononuclears diminished.
   Eosinophiles—none—or if
   The general condition of the patient is very bad, but not cachectic,
   Large doses calcium intravenously and by mouth, Iodine externally, oil by rectum, later small doses iodized oil intra-muscularly.

In the very young and old, pregnancies, myocarditis and the nervous vagotonics, calcium should be given in retention enemae,

Calcium chloride	Grammes	1
Luke warm water	"	200
Starch	"	4

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PEDIATRIC ENDOCRINOLOGY.

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It has been said that we live "in a sac of fluid." The chemical balance of this fluid—blood and serum—is maintained by a complex physiological circle composed of nerve centers, endocrine glands and hormones. A mutual inter-relationship exists between nerve centers and these glands. The former send impulses to the latter and these in turn influence nervous centers by producing hormones which circulate in the blood, reach these centers and influence their function. Clinical evidence points to close relationship also, of the various endocrine glands.

Probably the most often noted is hypo-activity of the thyroid resulting from a deficiency of the thyrotrophic hormone from the pituitary. Recent research has shown that the effect which is elicited by any given hormone depends upon the nature of the conveying medium. The most important factors include the PH of blood plasma and tissue fluids; the concentration of electrolytes such as calcium and potassium; and the presence of, and concentration of, lipoid substances such as lecithin and cholesterol.

Endocrinology should be of paramount importance to those of us whose primary interest is with infants and children, as it is here that we may be fortunate enough to discover early a pathological condition which, if corrected, may prevent an unhappy, retarded childhood and an anti-social adulthood. All bodily functions are influenced by these glands. They are concerned with nutrition and growth, with sexual activity, and with the mental development. Witness the giant or the dwarf with his improperly functioning pituitary; the cretin or the "slow", mentally retarded one with his underacting thyroid; the markedly irritable, emotionally unstable, hypoparathyroid case; the child with osteogenesis imperfecta. Time prevents mentioning more than these few of the many abnormalities. In addition to these, there exists the mental attitude of the child toward physical abnormalities produced by malfunction of these endocrine glands, as has been so admirably pointed out by Lurie, of Cincinnati, which may induce emotional conflicts of marked severity. This will often determine a child's outlook on life and govern his behavior.

It is not the purpose of this discussion to go into symptomatology or present case reports. It is but to bring, again, to your attention objective signs which should lead to an investigation of the endocrine system. In the early months one should be suspicious of the infant with decreased or increased muscle tonicity; one with coarse, dry hair; one who fails to hold the head up or try to sit up at the usual time. Later on the delayed appearance of the teeth; delayed creeping or walking or talking. Still later on temper tantrums, speech defects and destructiveness. Next comes the school age. The literature contains in-

numerable reports of improved intellectual status as a result of thyroid medication. Mild hypothyroidism is no doubt the most common of all hypoglandular cases and the easiest to correct, once recognized. I quote from Lurie: "What teacher has not come in contact with the child who is slow thinking and somewhat irritable, shows some form of speech defect, does not respond to the usual form of classroom discipline and is a school failure? Such children merit an endocrine examination because often they are suffering from varying degrees of thyroid deficiency. In this connection I wish to call attention to a clinical syndrome in which extreme restlessness, destructiveness and speech disturbance are the outstanding symptoms. This triad of symptoms when present in young children almost always indicates a state of hypothyroidism." Restlessness should be emphasized as it is so seldom thought of in hypothyroidism. Usually we think of restlessness as associated with *hyper*thyroidism. In children, however, hypothyroidism may have this as its outstanding objective symptom.

After the thyroid the next most common malfunctioning gland noted in children is the pituitary. This gland has most properly been called "The leader of the Endocrine Orchestra." Its proper function is not only important to growth and development but it also secretes substances that awake other glands to activity and stimulates others to greater activity—the lacteal glands and the pro-creative glands. We are all most familiar with Froelich's syndrome, dwarfism, genital infantilism and adiposity of the monsmanary girdle type. These children, when young, are cheerful, happy and content with their lot. Their intelligence is rarely below normal, unless the thyroid is secondarily affected, and may even reach the superior levels. However, their reaction time is usually slowed and they may, therefore, be at a disadvantage in an I. Q. test and be rated as subnormal. This slowed reaction time may also result in difficulty in keeping up with their class-mates in the school room.

This type child soon becomes conscious of his or her physical abnormality and resents the teasing of his associates. With this combination of handicaps we have a fertile field for the development of a morose individual who shuns his friends and retires to a world of fantasy, or he may become aggressive, dominant and anti-social as an expression of resentment—in either event a maladjusted, unhappy child. A mild type hypo-pituitarism may manifest itself only in that the child will fall asleep readily in school or even a movie theater. They are hard to awake to full consciousness in the mornings. This annoys both parent and teacher no end and is prone to be attributed to carelessness and indifference. Due to the fact that the pituitary secretes a thyrotrophic hormone, it is not uncommon to find a symptom-complex referable to both in the same individual and it is essential to both diagnosis and therapy to determine the relation of these two factors.

The surface of endocrinology has hardly been scratched. Much research is being done. We know now that the thyroid gland is instrumental in bone formation. Is it not possible that the prevention of rickets is not alone dependent upon sufficient calcium and vitamine D intake, but also upon a properly functioning thyroid? Is it not possible that altered reactivity—or allergy—is due to some malfunction of an endocrine or group of endocrine glands? There must be an underlying etiological factor that makes it possible for little Willie to eat an egg and enjoy it while little Jimmie breaks out with an urticarial rash or wheezes with asthma if he attempts it. Many years ago small doses of thyroid were given empirically, with reported good results, in infantile eczema.

What a bewildering kaleidoscope! Man, in health and disease, is still shrouded in mystery, still a paradox that defies reason and all the sciences that try to wrest the secrets from him. And long will it be before man knows man. "The life so short, the craft so long to learn": so sang Chaucer. Will it ever be learned?

1822 Monument Avenue.

OBSTETRICAL AMNESIA, ANALGESIA, AND ANESTHESIA — WITH SPECIAL ATTENTION TO THEIR EFFICIENCY, AND SAFETY TO MOTHER AND CHILD.*

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Within recent years, no subject related to obstetrics has received more attention than the one above. The obstetric patient now almost without exception demands a promise of relief of pain during labor, and unfortunately generally has the idea that it is a simple procedure, and without danger. Because of this demand, the search for an ideal agent has received added impetus, and the recent scientific literature abounds with articles on the subject. For this reason, it was felt that a review of some of the more recent work might help both the physicians and the patients—the former by summarizing the methods in use and attempting to properly evaluate them, the latter by proper instruction through the former rather than through incorrect ideas gleaned from lay journals.

Just what would be the ideal amnesic, analgesic, and anesthetic? Unquestionably, that which combined perfect efficiency with absolute safety to both mother and child. While other factors are concerned, these two are essential. What is the degree of any or all of the above qualities desired? Opinion varies from that of Nielson,[1] who believes the routine administration of analgesics in the first stage wrong, to that of Bill,[2] who advocates complete amnesia, analgesia, and anesthesia in all cases.

Nielson,[1] as well as others, feels that generally amnesics and analgesics are potentially more dangerous to the fetus, and anesthetics to the mother. She believes there is danger of personality damage by lack of the knowledge of childbearing.

Bill,[2] while emphasizing that no one method is suitable for all cases, advocates morphine-scopolamine in primiparae and sodium amytal in multiparae, using inhalation analgesia and anesthesia with nitrous oxide and oxygen alone or with ether, or ether alone. He stresses not giving scopolamine within three hours of the expected birth of the baby, and attributes his good results in more than twenty thousand cases to this. He considers a competent obstetrical anesthetist the most important single factor in the success of a case, and blames poor results on bad judgment rather than drugs. He thinks we should train men toward the use of what we consider ideal, rather than lowering the standards to those of untrained men.

Gwathmey[3] is enthusiastic about his own technic, and also states good results in more than twenty thousand cases. He gives sixteen reasons for its use, with only three contra-indications. He claims no lengthening of labor; decreased maternal morbidity and use of forceps; less post-partum hemorrhage than with any inhalation method; slight to good amnesia and analgesia; safety for home use by any physician; no fetal deaths; and success in better than 80 per cent of the cases.

Clifford[4] fears any opium derivative because of fetal asphyxia. He points out that the intensity of the morphine effect reaches its peak in four hours, and declines rapidly after the sixth hour, being practically nil after the eighth hour. His method is pentobarbital with or without scopolamine, and terminal nitrous oxide-ether. He thinks the addition of the scopolamine aids amnesia, and causes no effect in the babies. Pernocton gave a high percentage of cyanotic babies and poor amnesia. Paraldehyde and rectal ether gave no asphyxia, but no better amnesia.

Irving,[5] at the Boston Lying-in Hospital, studied various methods for a year, and reports his results in a most comprehensive article. He obtained no maternal deaths. The still-birth rate was less than in a year when no analgesics were used (0.93 per cent and 1.4 per cent). He attempted complete amnesia. In the pantopon series, primiparae received medication after two fingers' breadth dilatation; multiparae, when pains were good, regardless of the condition of the cervix. His results are shown in the following table (100 cases in seven and 160 in one group):

*Presented before the Roanoke Academy of Medicine, January 9, 1939.

METHOD	COMPLETE AMNESIA	PARTIAL AMNESIA	NO AMNESIA	EXCITED	P.P. HEM. OVER 300 CC.	SPONTANEOUS BREATHING
Pantopon and scopolamine	39	34	27	10	25	33
Pantopon and rectal ether	18	67	25		16	53
Pernocton	42	43		15 15 con. mov.		53
Sodium amytal and scopolamine	80	20	0	17.5		61
Pentobarbital and scopolamine	86	14			3	63
Sodium amytal and rectal ether	70	25	3			59
Pentobarbital and rectal ether	66	28	6			
Pentobarbital and paraldehyde	64	20	16			50

On the Out-Patient Service, without anesthesia, only 1.9 per cent of the babies failed to breathe spontaneously, and only 20 per cent of those in the hospital with gas-oxygen and ether anesthesia. The total operative incidence was lessened as compared to a year when no analgesics were used (35.6 per cent and 44.6 per cent). He feels pentobarbital and scopolamine the best method, the only valid objection being restlessness.

Galloway,[6] with nembutal and scopolamine, had 93.6 per cent pain relief, and felt that infant and maternal morbidity and mortality were not increased, but the operative incidence was. He advises against use in the home, as the patients require constant and intelligent supervision. He[7] also asked the opinion of pediatricians and patients, and the majority of both favored the method.

Krebs,[8] of St. Louis, has also used the morphine-scopolamine technic and, in 3720 deliveries, experienced only 2.6 per cent fetal mortality. He mentions that animal experimentation shows scopolamine, in greater than needed doses, causes no change in respiration or blood pressure. In using the barbiturates with scopolamine, he feels he reduces the fetal apnea, and says there is no proof of trouble from fetal apnea. Both methods produced excitement. He considers a trained obstetrician and hospitalization necessary. Wulff, his co-worker, had no fetal apnea in cases receiving ortal sodium and scopolamine.

Lewis[9] considers labor trauma of greater responsibility than analgesics in the production of depression of the respiratory center. He advocates little analgesic other than nitrous oxide-oxygen, and at sufficient interval before delivery to prevent said depression.

Montgomery[10, 11] feels the use of amnesics, analgesics, and anesthetics is an important factor in the high intrapartum death rate. He believes ether the safest anesthetic; objects to the Gwathmey method because it is a poor amnesic; considers chloroform or spinal anesthesia dangerous; objects to the barbiturates because of cyanosis, respiratory depression, thready pulse, and shock; and feels that local anesthesia should be used more often.

Daichman[12] believes morphine the most valuable single drug, and sodium amytal and scopolamine the best method. He reports 92.4 per cent analgesia, 67.9 per cent amnesia, and only 1.8 per cent fetal asphyxia. He had 74 per cent fetal apnea following the Gwathmey method, and avertin tended to permit bad post-partum hemorrhage.

Point[13] believes nitrous oxide the best anesthetic, and defends the use of cholorform in normal cases. He feels that spinal anesthesia is no good for obstetric use, and that caudal anesthesia is dangerous. He considers the Gwathmey method the most widely used single method. He uses thymophysin to shorten labor.

Lundy[14] concludes that nitrous oxide and ethylene are the most flexible anesthetics. He thinks ether all right, but that the oil-ether colonic method is not sufficiently analgesic, and that it slows labor. Avertin caused restlessness, and it is difficult to estimate the safe dosage. The barbiturates he thinks fail to relieve hard pain; that there is danger of delayed poisoning from chloroform; that local and regional anesthesia will be more widely used; that spinal anesthesia tends to cause hemorrhage; and that abdominal block is useful in certain conditions.

Adair,[15] in experiments on the post-partum uterus, found that most analgesics caused either relaxation of the uterus between contractions; lengthening of the interval between contractions; or lessening of the contractions, and feels that the same effect may be produced on the laboring uterus.

Kane,[16] with rectal paraldehyde, reports 89.7 per cent complete, 2.6 per cent partial, and 7.7 per cent no amnesia. He feels that the early administration, regardless of the type of pains or the condition of the cervix, is in favor of this method. He believes

that the relief of pain not only pleases the patient, but that it also prevents obstetric shock, and permits a better post-partum course.

Douglas[17] uses oral paraldehyde with aromatic elixir, preferably preceded by one hour by nembutal or pantopon. He reports 94.3 per cent complete amnesia, and only slight asphyxia. He feels the method safe for home use.

Colvin[18] uses oral paraldehyde preceded by nembutal or sodium amytal. He advises stimulation of pains if uterine inertia persists for more than an hour following the administration of the paraldehyde.

Kassebohm[19] obtained quiet induction of sleep after intravenous evipal or pentothal. He had no respiratory difficulties or post-partum hemorrhage. He feels the patients are subject to marked individual susceptibility.

Siegler[20] uses evipal rectally with scopolamine, and reports no retardation of labor, no bad effects on the new-born, no post-partum hemorrhage, and good analgesia and amnesia. He feels the method safe.

Graffagnino[21] believes epidural anesthesia should be part of the armamentarium of every trained obstetrician and anesthetist, as all major obstetric procedures can be performed safely and with the conscious cooperation of the patient, except version.

O'Connor[22] uses the barbiturates and scopolamine in the first stage, followed by pudendal nerve block. He feels that spinal and caudal anesthesia and sacral block must also be considered.

Caine[23] considers ether the preferable anesthetic, but says that the condition of the patient, apparatus, knowledge of use and what to expect, opinion of the obstetrician, and presence of a skilled anesthetist are all factors influencing the type used. He thinks ether and chloroform best for the lone practitioner, but believes the latter always damages the liver and kidneys to some degree. He prefers ether and cyclopropane to nitrous oxide as an analgesic, and feels that continuous inhalation analgesia is practical when a skilled anesthetist is present.

Schreiber[24] believes that cerebral anoxia, caused by "variable factors" under the theoretical heads of (1) metabolic anoxia, (2) anemic anoxia, and (3) drug anoxia, may cause cerebral damage in the newborn. The same author[25] feels that all drugs used as analgesics and amnesics cause depression of the respiratory center, and believes they may so depress the maternal respiratory center that a dangerous anoxemia ensues in the fetus with resultant changes in the brain, even though, because of the time elapsing between medication and delivery, no anoxemia may be evident at birth. He states that the late microscopic changes of cerebral anoxia are death of nueral tissues with gliosis, and the gross end-result is atrophy of the brain. Of 500 cases seen for cerebral symptoms, about 72 per cent gave a history of birth apnea. There was only 2 per cent apnea in cases not receiving analgesics and amnesics. He feels we must consider the remote as well as the immediate effects of these drugs, and re-evaluate the relief of pain.

For the past eleven years, and following training by Bill, this essayist has used the morphine-scopolamine and sodium amytal technics[2] as outlined by him for primiparae and multiparae respectively. The results have been uniformly good. Since the publication of the article by Krebs[8] he has modified it to the extent of continuing the scopolamine longer, and using inhalation analgesia and anesthesia only as needed for the control of second stage pains, and has also added scopolamine to the sodium amytal method, repeating the scopolamine as in the morphine technic, and seldom if ever repeating the sodium amytal. He now feels the success of the method of the morphine- scopolamine technic is not due to the withholding of scopolamine, but to the fact that morphine is practically never given within six hours of delivery. Clifford's[4] findings regarding the intensity of the morphine effect would verify this belief. Certainly the later continuation of scopolamine in the primiparae, and its addition to the sodium amytal in the multiparae, has greatly reduced the amount of inhalation analgesia and anesthesia needed, and there has been, if anything, a further reduction in fetal asphyxia. It is the feeling of this author that, in the hands of trained men, these methods will give the best results, with the warning that every case must have careful judgment, and that no one method will suffice for all cases.

CONCLUSIONS

1. No safe and ideal agent as an obstetric amnesic, analgesic, and anesthetic, has been found.

2. All methods now in use should be performed in the hospital by trained obstetricians.

3. In the use of the morphine-scopolamine technic, fetal asphyxia will be practically nil if no morphine is given for six hours prior to delivery.

4. The recent findings on the late effects of analgesic and amnesic drugs may cause a complete revision of present ideas concerning the value of relief of pain in labor.

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INTESTINAL OBSTRUCTION.*

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Intestinal obstruction continues to be one of the most serious conditions arising within the abdomen, carrying a high mortality rate unless it is recognized early and proper treatment is instituted. There are few conditions arising within the abdomen that can so thoroughly test the diagnostic ability and surgical judgment of the surgeon as does intestinal obstruc-

*Read before the Tidewater Surgical Club, Norfolk, March 2, 1939, and before the Norfolk County Medical Society, May 8, 1939.

tion. This paper will be confined to a discussion of mechanical and paralytic obstruction.

ETIOLOGY

Mechanical obstruction is the cause of the majority of cases of intestinal obstruction, and two-thirds or more of all cases of mechanical obstruction are due to strangulated external herniae and to bands and adhesions. While most bands and adhesions are post-operative, it is estimated that from 5 to 15 per cent of all cases of mechanical obstruction occur where there has been no previous surgery. The next most frequent causes of mechanical obstruction are neoplasms (about 10 per cent) and strictures. The neoplasms may be benign or malignant; the strictures may be congenital or acquired. Intussusception, volvulus, internal herniae, mesenteric thrombosis, Meckel's diverticulum, gall-stones and other foreign bodies account for nearly 20 per cent of the cases of mechanical obstruction. Incomplete mechanical obstructions may be converted by cathartics into complete obstructions.

Paralytic ileus occurs most often in patients having peritonitis, but various grades of it from partial

Complete obstruction of small bowel with fluid levels.

Incomplete obstruction due to carcinoma of tranverse colon.

to complete ileus frequently occur following intra-abdominal operations and many other conditions. It occurs often following operations where there has been much handling of the intestines, especially if it has been necessary to free bands and adhesions, and where all the raw surfaces can not be completely covered. Paralytic ileus following intra-abdominal operations may cause many anxious moments, but if peritonitis does not develop, and if proper conservative measures are instituted immediately, death should rarely, if ever occur. Paralytic ileus may result reflexly from torsion of the omentum, spermatic cord or ovarian cysts, etc. It frequently occurs during the course of infectious fevers (such as pneumonia, etc.); from injuries to the abdomen and spinal column, and diseases of the spinal cord. Paralytic ileus may occur following hemorrhage into the peritoneal cavity.

SYMPTOMS

The symptoms of mechanical obstruction will vary with the type of the obstruction, with the location of the obstruction in the intestines (whether large or small), whether the obstruction is complete or incomplete, and whether strangulating or simple.

In early obstruction the patient does not as a rule appear particularly ill, and for that reason the seri-

ousness of the condition may escape the examiner unless he takes a careful history and auscultates the abdomen during the cramps. So we must be ever mindful of the fact that the patient with early simple mechanical obstruction will not appear particularly ill. *Pain, nausea, vomiting* and *distention* are the chief symptoms. Constipation may be a prominent symptom, but in intussusception (and at times in mesenteric thrombosis) there are usually thin, watery, blood-stained stools. Intussusception occurs usually in early life, 75 per cent of the patients being under two years of age.

Pain. In mechanical obstruction there may be a few premonitory symptoms and then a sudden change to severe colicky pains. Early, the pain is in the umbilical or epigastric regions, but later the whole abdomen may be involved. Pain is the earliest symptom of obstruction. While pain and vomiting occur early in mechanical obstruction of the small intestine, distention is a late symptom. In mechanical obstruction of the large bowel, pain and distention occur early—the distention soon becoming marked if the obstruction is complete. The pain is crampy, intermittent, and of short duration. The cramps soon recur, and they are usually severe. No discomfort is ordinarily experienced between the cramp-like pains in early, simple obstruction; later, however, there may be continuous discomfort between the cramp-like pains, but when this occurs there will probably be distention and there may be beginning interference with the circulation of the bowel. On the other hand, in strangulation obstructions there may be transudation of fluid and blood into the peritoneal cavity, which will give rise to a more continuous type of pain, in addition to the colicky pains. So when there is discomfort between the colicky pains early in obstruction, we should think of the strangulating type of obstruction. The pain in late obstruction is not as marked as in the early hours.

Paralytic ileus accompanying vascular degeneration of the spinal cord.

The occurrence of rhythmical cramp-like, colicky pains with an accentuation of noises (borborygmi) at the height of the pain, established the cramp as intestinal colic. After a diagnosis of intestinal colic has been determined by the intimate relationship between the occurrence of the noises and pains, then it will be necessary to rule out other conditions such as enterocolitis, food indiscretions and allergy—which may be accompanied by intestinal colic—before a diagnosis of intestinal obstruction (mechanical) can be made. In strangulation obstructions, after the development of gangrene, sooner or later the peristalsis may cease and the abdomen become silent.

Vomiting. In mechanical obstruction of the small bowel, vomiting is an early and prominent symptom. The vomiting is usually profuse, and the higher the obstruction the more pronounced is the vomiting. Vomiting is often more profuse in mechanical obstruction of the small bowel than in any other condition. While the vomitus at first consists of the stomach contents, there is soon regurgitation into the stomach of the contents of the upper part of the intestines which are stained with bile, and later the vomitus—if the obstruction is not relieved—becomes of a darker color, and has a foul fecal odor. When fecal vomiting occurs in mechanical obstruction, the obstruction is nearly always in the small bowel, and the condition of the patient is always critical. Vomiting is not a prominent symptom of obstruction of the large bowel; in fact, it ordinarily occurs late, and there may even be enormous distention without the occurrence of vomiting. If much vomiting does occur it is usually reflex, or there may be peritonitis. This is due to the fact that the ileocecal valve and

Paralytic ileus--post-operative.

sphincter when adequate (probably in more than a majority of the cases) do not permit a regurgitation of any particular consequence of the contents of the colon into the ileum, thereby forming practically a closed loop of bowel; therefore, vomiting would be expected to occur late.

Distention. Because vomiting occurs so early and frequently in mechanical obstruction of the small intestine, it is easy to understand why distention ordinarily occurs only late. In mechanical obstruction of the large bowel, because the ileocecal valve and sphincter often do not permit regurgitation into the ileum, the colon rapidly becomes distended and the distention becomes evident early.

Tenderness. Early in simple obstruction there is no tenderness or rigidity of the abdomen, except during the height of the pain. In strangulation obstruction there is tenderness of the abdomen, and the pain is more severe than in the simple type of mechanical obstruction. Whether tenderness is or is not present may be a helpful point in the differential diagnosis of early, simple and strangulation obstructions. Tenderness occurs in late, simple obstruction. Whenever a mass develops, there is marked tenderness, and the viability of the bowel is diminished.

In strangulation obstruction the seriousness of the condition will become apparent much earlier than in the simple type, which will be noted by the appearance and general condition of the patient. In late obstructions, when much vomiting has occurred, dehydration becomes marked, unless the fluids and electrolytes have been replaced. Early in mechanical obstruction there is no increase of temperature or pulse rate, but when they are increased, the pulse rate is always increased first. In strangulation obstructions, shock may occur fairly early, and then the temperature would be subnormal and the pulse weak and fast; the shock depends to a great extent upon the length of the loop involved, upon the blood loss and upon the extent of the intoxication. Late in mechanical obstructions, there are fever and an increased pulse rate, with symptoms of dehydration, intoxication and probably symptoms of peritonitis. Patients with strangulation obstructions are always sicker than those with the simple types of obstruction or with paralytic ileus, unless the ileus is accompanied by peritonitis.

Chronic Obstructions. In the chronic types of obstruction, distention is more likely to be present early, and there may be visible peristalsis. Ordinarily, visible peristalsis does not occur in acute obstructions.

PARALYTIC ILEUS

In paralytic ileus distention and vomiting occur early; the pain is usually continuous and the cramps, when they occur, are not as frequent or as severe as in mechanical variety. The distention soon becomes marked, if measures for decompression are not instituted early. The vomiting, while not as profuse as in the mechanical obstructions of the small bowel, is a prominent symptom, and if the ileus persists, and decompression is not accomplished, the vomiting will become fecal. In well established paralytic ileus, the abdomen is silent. In paralytic ileus there is some general tenderness, but usually it is not as marked as in strangulation (and late) obstructions, unless peritonitis is present.

LABORATORY AIDS

Early in intestinal obstruction when the patient does not appear to be particularly ill, the laboratory will offer very little help. However, in high obstructions, when vomiting has been marked and dehydration and infection have occurred, there will be

increased N. P. N., usually increased CO_2 combining power of the blood, increased W. B. C., possibly increased R. B. C. and hemoglobin, with decreased blood chlorides and scanty urine of high specific gravity. In low obstructions and when the vomiting has not been so frequent and over a longer period, acidosis is more likely to be present. The kidney function in these cases should not be below normal, however, unless there was subnormal function before the obstruction, as it has been shown by the adequate administration of normal saline and glucose that the diminished urinary output will soon return to normal.

These chemical variations of the blood occur late, except in the very high obstructions, and the purpose of these examinations is to assist in the intelligent management of the cases, rather than to aid in the diagnosis.

X-RAY

There is one laboratory aid, the X-ray, which can be of such great help that it should never be omitted in suspected cases of intestinal obstruction, unless it is decided the patient is too ill to move, and in that event it is questionable if any procedure would benefit the patient. Normally, gas is not observed on the roentgen film of the gastro-intestinal tract after the third year of life, except in the colon and stomach. It is necessary for food and the intestinal contents to remain for sometime before gas could be visualized. Normally, there is such an intimate mixture between the gas and fluid, and such a rapid movement of the intestinal contents in the small bowel, that the gas cannot be seen. Therefore, for gas to be visualized, it is necessary for stasis of the intestinal contents to exist, and it is observed on the roentgen film only after stasis has existed for four or five hours. So, when gas is observed in the small intestine on the roentgen film, a diagnosis of intestinal obstruction usually should be made, especially if there is much distention of the bowel. A diagnosis of obstruction should not be made, if the bowel is not distended. When the acute obstruction is of the large bowel, the distention will be confined mainly to the colon; the gas is usually at the lateral borders of the abdomen and the long axis is generally vertical. In small bowel obstruction, the gas is observed in a more central location, and the long axis is usually transverse; the shadows are described as being of a herring-bone appearance and step-ladder arrangement, with fluid levels. With fluid levels an absolute diagnosis of complete mechanical obstruction of the small bowel can be made. Accordingly, the roentgenologist can often differentiate between obstructions of the small and large bowel, between mechanical and paralytic obstructions, and between complete and incomplete obstructions. When one can not decide whether the obstruction is in the large or small bowel, a roentgen film taken after a small, thin barium enema is helpful in the differentiation. A large enema given under much pressure would be dangerous, and it also would be dangerous to give a barium enema in late, large bowel obstructions. The pressure from a barium enema is greater than the intra-colonic pressure in obstructions. When there is marked distention of both the large and small bowel, a diagnosis of paralytic ileus should be made. Ordinarily, much information can be elicited from a picture taken with the patient recumbent, but additional information about fluid levels may be obtained with the patient upright or on the side.

It is not always possible to state definitely whether the obstruction is complete or not, but the greater the distention, the more likely is the obstruction to be complete. Incomplete obstructions are more difficult to diagnose than complete obstructions. If the obstruction of the large bowel is complete, there will be enormous distention and, after the gas below the obstruction has been evacuated, there will be no recurrence of the gas below the obstruction. In incomplete obstructions of the large bowel the distention is not so great, gas may still be evacuated from the rectum, and sooner or later one will observe gas below the obstruction on the roentgen film after enemata have been given. In small bowel obstruction, if the gas is observed to persist on the roentgen film in the colon after enemata have been given, the obstruction is incomplete; if no gas is observed in the colon after an enema has been given, the obstruction of the small bowel is considered to be complete. The X-ray films are difficult to interpret at times, so the statements concerning the information to be obtained from them must not be taken to mean that it will always be 100 per cent correct, but it is probably nearer correct to state that the information is true in about 70-75 per cent of the cases. The clinical findings and history must always be taken into consideration with the X-ray diagnosis.

PATHOLOGIC AND PHYSIOLOGIC CONSIDERATIONS

It has been calculated by Rountree (quoted by Wangensteen) that "7,000 c.c. of fluid enters the

bowel each day through the glands which empty their secretions into the alimentary canal, there being about 1,500 c.c. of saliva; 2,000 to 3,000 c.c. of gastric juice; 300 to 500 c.c. of bile; 500 to 800 c.c. of pancreatic juice and 3,000 c.c. of succus entericus. During obstruction of the intestines these secretions are thought to be increased."

The distention of the bowel results from fluids and gases. The amount of the distention will depend upon the location of the obstruction, whether the obstruction is complete or not, upon the amount of vomiting, the viability of the bowel, upon the infection and upon the amount of hemorrhage. Wangensteen says "the gas results from swallowed air (68 per cent); from diffusion of blood gasses into the intestinal lumen (22.4 per cent); and from the results of digestive processes and decomposition of the intestinal contents (9.6 per cent). More gas is formed from the putrefactive action of bacteria on carbohydrates than on proteins."

The loss of fluid and electrolytes from the upper intestinal tract (in high obstruction) results in increased N. P. N., increased CO_2 combining power of the blood, and a decrease of blood chlorides. Saline is not supposed to neutralize the toxins, but it acts as a substitute by replacing the loss of fluids and electrolytes, including sodium and chlorides.

Normally, absorption from the bowel is through the lymphatics and the radicles of the portal vein. It has been shown that the obstructed bowel is permeable to substances to which the normal bowel is not permeable, such as bacteria and toxins. The increased intra-enteric pressure, gangrene and peritonitis with resulting toxemia produces the bad effects. Normal absorption is decreased as the intra-enteric pressure rises. Blood loss may be significant in strangulation obstructions. The intra-enteric pressure should be reduced as soon as possible, and the outcome will depend to a great extent upon how soon the increased intra-enteric pressure is relieved. The time element is an important factor in intestinal obstruction; the longer the obstruction has been standing the greater the mortality rate will be. The bowel below a mechanical obstruction is acting normally or near normal. The bowel is not actually paralyzed in paralytic obstructions (unless extremely late) as shown by the contractions following spinal anesthesia.

DIAGNOSIS

What are some of the causes for delay in making diagnosis?

(1) Lack of physical findings (in the early simple obstruction) and the fact that the patient does not appear particularly ill.

(2) Enemata. Enemata may help to establish the diagnosis, but they are sometimes misleading, and in some cases may actually delay the diagnosis until it is too late. If results are obtained from the first enema, a second enema and perhaps a third one should be given.

(3) Opiates. They may completely relieve the pain, and prevent a diagnosis of intestinal colic. Opiates should never be given until after the diagnosis has been made. The use of opiates and cathartics in abdominal pain should be discouraged by physicians everywhere. Opiates confuse the diagnosis and cathartics may lead to disaster.

How are we to arrive at the diagnosis of a condition which has puzzled and continues to puzzle surgeons everywhere?

There are cases in which it is impossible to say definitely whether the bowel is obstructed or not, and, if obstructed, whether the obstruction is complete or incomplete. Particularly is this true when there is an inflammatory condition within the abdomen; and in patients with intestinal colic, if they have had one or two stools. One should take a careful history, bearing in mind the possibility of intestinal obstruction. Then, a careful examination with observation of external herniae or scars, auscultation of the abdomen, and roentgen films will usually settle the diagnosis. It must be remembered, however, that dense bands and adhesions may be causing obstruction, even though there has been no previous surgery.

In mechanical obstruction we must first make a diagnosis of intestinal colic, because mechanical obstruction, except in its very latest stages, is always accompanied by intestinal colic. However, intestinal colic is not always easy to diagnose. If increased peristaltic activity is not heard during the first examination, examine and auscultate the abdomen again and again. Be sure to ask the patient if he has ever had a similar pain following food indiscretion, as it may be a helpful point in establishing the fact that he has intestinal colic. Patients occasionally experience intestinal colic before defecation. A similar pain described by the patient certainly would focus one's thought on the possibility of in-

testinal colic. After intestinal colic is diagnosed, it is necessary to eliminate those conditions other than obstruction which can cause intestinal colic, such as allergy, food indiscretion and enterocolitis. With these conditions eliminated, it is then safe to diagnose mechanical obstruction. If the abdomen were auscultated more often during pain, the diagnosis of intestinal colic and obstruction would seldom be missed.

Rectal examination should be made in all cases of suspected mechanical obstruction. After a diagnosis of early mechanical obstruction has been made, if there is no tenderness or rigidity of the abdomen, it is fairly safe to assume that the obstruction is simple. On the other hand, if the intestinal colic is accompanied by tenderness and rigidity of the abdomen, a diagnosis of strangulation obstruction should be made; however, it is not always possible to determine whether the blood supply of the bowel in a given case has been interfered with or not.

We should never omit the X-ray in suspected cases of intestinal obstruction, whether mechanical or paralytic. The very fact that much gas may be expelled after enemata, or that the patient may have normal bowel movements, must never deceive us, because normal bowel movements may occur with complete mechanical obstruction.

In paralytic obstruction there will be marked distention of the abdomen, and the abdomen is almost or completely silent. Auscultation of the abdomen and roentgen films will establish the diagnosis in nearly all cases of paralytic ileus.

ANESTHESIA

In the good risk patient spinal anesthesia is probably the best of all the various forms of anesthesia, but in the poor risk patient a spinal anesthetic should not be used. When spinal anesthesia is contra-indicated, ethylene and local anesthesia are to be preferred, and if more relaxation is needed, some ether may be given. The stomach must be kept empty during inhalation anesthesia. Enterostomy could be performed under local anesthesia. For spinal anesthesia, pontocain is preferred to novocain when a more prolonged anesthesia is desired.

MORTALITY

The mortality rate usually varies with the condition of the bowel (extent of gangrene or degree of distention), with the duration of the disease (the mortality rate increasing about 1 per cent with every hour of delay in acute mechanical obstruction), with the general condition of the patient (whether or not he has peritonitis, toxemia, shock, fever, dehydration, etc.), with the condition causing the obstruction, and with the rationale of the therapeutic procedures instituted. In most large series of acute mechanical obstruction the mortality rates are as high as 30 per cent or more, one clinic reporting a mortality rate as high as 70 per cent. The mortality rate is always high in late mechanical obstructions; and also in mesenteric thrombosis, unless the condition is recognized early, and a small segment of the bowel is involved. Strangulated external herniae with viable intestine carry the lowest mortality rate.

In paralytic ileus resulting from peritonitis, the mortality rate is necessarily high, the rate depending more upon the peritonitis than the ilieus, but there should be virtually no mortality from paralytic ileus itself, with proper treatment.

TREATMENT

The treatment will vary considerably, according to the experience and the training of the attending physician. There are two general methods of treatment: first, conservative decompression, and, second, operation.

There are several measures which are used in conjunction with either conservative decompression or operation, which are extremely helpful and may at times be life saving. Saline solution (normal or hypertonic as indicated), Hartman's solution, glucose or Ringer's solution may be used. Saline is absolutely essential if there has been much loss of fluids. Particularly is this true in high obstructions. It should be given in the pre-operative preparation and in the post-operative care. It is of valuable aid in restoring kidney function. Its value is in bettering the patient's general condition as it does not actually neutralize the toxins—it neutralizes their effects.

Glucose is absolutely essential if there is acidosis or diminished urinary output, but it should be given before these symptoms have occurred. Therefore it is important to give both saline and glucose early in these cases, before they have become dehydrated, and before marked chemical variations of the blood and urine have occurred.

Blood transfusion may be indicated in all types

of obstructions, but it is particularly useful in strangulation obstructions and mesenteric thrombosis, where the blood loss factor may be significant; in chronic obstructions, as there are often anemia and low blood protein; and in paralytic obstructions with peritonitis. Blood transfusion should never be omitted when the patients are in or near shock, as they may be in cases of mesenteric thrombosis, strangulation obstructions or obstructions accompanied by peritonitis.

Conservative decompression (Wangensteen suction or duodenal suction. Miller-Abbott method of intubation of the intestines). Wangensteen suction is adequate for decompression of most cases of paralytic ileus. The Miller-Abbott intubation of the intestines has an advantage over Wangensteen suction in that it more adequately drains the bowel above the obstruction, but it requires several hours to pass this tube down the intestines—and while waiting for the tube to pass in mechanical obstruction, the bowel may have become devitalized and the condition of the patient becomes critical or hopeless.

Conservative decompression may be employed in most cases of incomplete simple obstruction; and it may be tried for short periods of time in some cases of complete simple obstruction, provided the patient is checked often, and the symptoms are improving. When employing conservative decompression in complete, simple obstruction, the surgeon is assuming a great responsibility (he is assuming also that he understands the pathology well enough to know that the suction has a good chance to relieve the obstruction). It is absolutely essential to recheck the condition with X-ray films at least every four to six hours unless recovery is definitely assured. Conservative decompression must not be continued in cases of simple obstruction when there is no evidence of improvement. In strangulation obstructions, conservative decompression should be used only in conjunction with operation. Oxygen inhalations are useful to help relieve distention when used with suction.

Paralytic Ileus. Conservative decompression is the treatment *par excellence* in paralytic ileus. In addition to conservative decompression in paralytic ileus, pitressin, turpentine stupes, etc., are often beneficial. If pitressin is not effective, prostigmin may be tried. Most authorities state that it is probably not advisable and may be dangerous to use strong intestinal stimulants in peritonitis; however, there are others who believe that pitressin is not only indicated in paralytic ileus with peritonitis, but that it should be given often. Rectal suction may be used in conjunction with duodenal suction in paralytic ileus, but the procedure as a rule is not very effective.

Cautions to be Observed When Employing Conservative Decompression:

1. The loss of fluids and electrolytes must be replaced.

2. The patient must be examined frequently when employing conservative decompression in mechanical obstruction, as the condition may change enough in a short period to demand prompt surgery.

3. When using conservative decompression in mechanical obstruction, do not use morphine, as it is necessary to know whether the patient is having pain or not.

Indications for Conservative Decompression in Intestinal Obstruction:

Conservative decompression has its greatest field of usefulness in paralytic ileus; in incomplete mechanical obstructions, particularly those occurring early in the post-operative period, and in conjunction with surgery. It is employed for short periods with caution in certain selected cases of complete simple mechanical obstruction. Conservative decompression, particularly the Miller-Abbott method, can be employed as a diagnostic measure as well as a therapeutic agent.

Contraindications to Conservative Decompression:

1. Strangulation obstructions, except in conjunction with operation.

2. Marked distention of the colon from acute mechanical obstruction of the colon, because it acts essentially as a closed loop.

Indications of Successful Conservative Decompression:

1. Decrease of, or complete relief of, distention.

2. Decrease of, or complete relief of, pains.

3. In complete obstructions, the reappearance of gas in the colon on roentgen films. There should also be a decrease in size of distended bowel.

4. The appearance of barium on the roentgen film beyond the former site of obstruction, the barium being injected through the Miller-Abbott tube while it is still *in situ*.

5. A decrease in the amount of fluid obtained by

suction and it should not have the appearance of lower intestinal contents.

6. With temporary discontinuance of suction, there must be no return of the distention or discomfort.

OPERATIONS

The greatest danger of operation is the possibility of infection and the sudden release of toxins.

Operation should be performed in all cases of strangulation obstructions; in all cases of complete, simple obstructions, if the patient is seen early and his condition is good, and in those cases of incomplete obstruction where conservative decompression would not be expected to relieve the pathology. There are certain cases of simple obstruction of the small bowel which can be relieved by conservative decompression, but ordinarily delay is not justifiable in complete obstruction. When in doubt in early cases, operate. Do not delay operation long if X-ray is not helpful; if you diagnose or are very suspicious of mechanical obstruction before X-ray findings are positive, operate on suspicion. Whenever one decides to use conservative decompression instead of performing an operation in simple obstruction, he is doing so with considerable risk. Conservative decompression in conjunction with operation is of invaluable aid.

The type of operation should vary according to the findings and the condition of the patient. In most simple obstructions all that is necessary is to release or remove the obstructing agent; however, if there is much distention or toxicity, an enterostomy (Witzel) in addition is advisable. Enterostomy should be performed more often following resection, and following the release of bands and adhesions. When there is a bloody discoloration of the peritoneal fluid, look for strangulation. Never leave gangrenous bowel in abdomen. When part of the bowel is not viable it is necessary to decide whether to do a primary resection and anastomosis, or to exteriorize the bowel; the condition of the patient would be the deciding factor. Exteriorization is not advisable in obstructions high in the small bowel. To quote from Wangensteen, "On the whole it may be said that it is much safer to exteriorize devitalized bowel, cut it off when the skin is closed, and tie in catheters into the proximal and distal loops, than to do a primary resection". In obstruction of the large bowel, colostomy should be routine. If the small bowel is gangrenous and the condition of the patient is not good, exteriorize the bowel, or excise the gangrenous gut and do a double-barrel enterostomy. When there is not too much distention it is well to defer for a few days excision of the exteriorized gangrenous bowel in order to minimize the danger of contamination and infection. When there is tenderness of the abdomen, it is better to treat the obstruction as strangulated. In late obstructions thoroughly prepare the patient before operating. Some reports are rather favorable to the use of anti-gas serum in conjunction with surgery. Aluminum paste is helpful in preventing excoriation of the skin from irritation of the intestinal contents.

If it is decided to do a primary resection, an absolutely rigid aseptic technique must be followed. The edges of the skin are potentially infected, and they should be covered at all times. To permit the intestines to lie against the uncovered skin is a break in technique that should never occur. Evisceration and excessive manipulation should be avoided. There should be no sponging or mopping with the hands; instruments should be used instead. In suturing the intestines it is necessary to keep a certain distance from the edge with each suture, and to place the stitches the same distance apart, because if these rules of suturing are not observed, then one will never have any definite idea of the water tightness of the suture line. By careful attention to detail and technique in suturing, one should be able to make a water-tight closure. Of course, in doing a resection, it is essential to resect enough of the proximal bowel so that one will have viable tissue to suture. It is also necessary that enough fat be excised from the mesenteric borders of the ends of the bowel, so that one will not be suturing fat instead of intestine when the closure is made. For most purposes, a continuous suture is satisfactory, but where reinforcing is to be done, Halsted mattress sutures are preferred. If silk is used for the mucosal suture, the knot must be tied within the bowel. Silk is preferable for the serosal suture material, and the smallest size that has the necessary strength should be used—either number 4 black twisted silk, or number 0 or 1 serum-proof silk. Enough time must be taken to carry out a careful and aseptic technique. Certainly there should be no waste of time, but it is a mistaken idea to think that one cannot take enough time to assure a water-tight closure, and enough time to avoid soiling. If the patient will not stand a resec-

tion properly done, then a less formidable procedure should be performed. Zephiran is probably one of the most efficacious of the present-day antiseptics; it is splendid for preparing the abdomen and also for washing the gloves while doing intestinal surgery.

CONCLUSIONS

Delay is the chief cause for the high mortality rate in intestinal obstruction.

The use of the stethoscope in all cases of abdominal pain, and the frequent use of the X-ray in all cases of suspected intestinal obstruction, should materially reduce the mortality rate.

Suspect intestinal obstruction in all cases of intestinal colic, until proven otherwise.

Enemata should be regarded with reservation when used as a diagnostic agent.

Opiates must not be given in cases of abdominal pain when there is any doubt about the diagnosis.

Whenever there is doubt about the patient's ability to withstand a resection, it is advisable to exteriorize the bowel.

When in doubt as to the proper method of treatment, particularly in the early cases, operate.

Conservative decompression should be employed in all cases of obstruction; it is the treatment of choice in paralytic ileus and in most cases of incomplete mechanical obstruction; it reduces the need for enterostomy.

Operate early in all cases of strangulation obstruction.

Much delay in operation is ordinarily not justifiable in complete obstruction.

Acknowledgment is gratefully accorded to the authors listed below, for all information which has been obtained from their various writings.

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509 Medical Arts Bulding.

INTRA-ABDOMINAL HERNIA.

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Hernias about the duodenal-jejunal flexure have been classified as duodenal, para-duodenal (right and left), retroperitoneal, internal and intra-abdominal hernias. Alexander in 1937 suggested that the term "intra-abdominal" hernia be used, as para-duodenal was confusing, since the hernia was in no way associated with the duodenum. The condition is characterized by the protrusion of the small intestine through an anomalous opening within the abdominal cavity.

The condition may occur on the right or left side, and to date there have been about 200 cases reported, in the ratio of about three on the left side to one on the right. Approximately 60 per cent of the right side lesions have been operated on with a 55 per cent mortality rate. The figure is not as high for lesions of the left side. The case of intra-abdominal hernia here reported occurred on the left side, was operated on and made an uneventful recovery.

The condition was first described by Neubauer in 1776, the right side type being first described by Klob in 1861. Moynihan in 1899 described nine folds and fossae about the duodenal-jejunal flexure in which these hernias may occur, namely:

1. The superior duodenal fossa.
2. The inferior duodenal fossa.
3. The posterior duodenal fossa.
4. The duodenal-jejunal fossa.
5. The inter-mesocolic fossa.
6. The infra-duodenal fossa.
7. The para-duodenal fossa, or fossa of Landzert.
8. The mesenterio-parietal fossa, or fossa of Waldeyer.
9. The para-jejunal fossa of Broski.

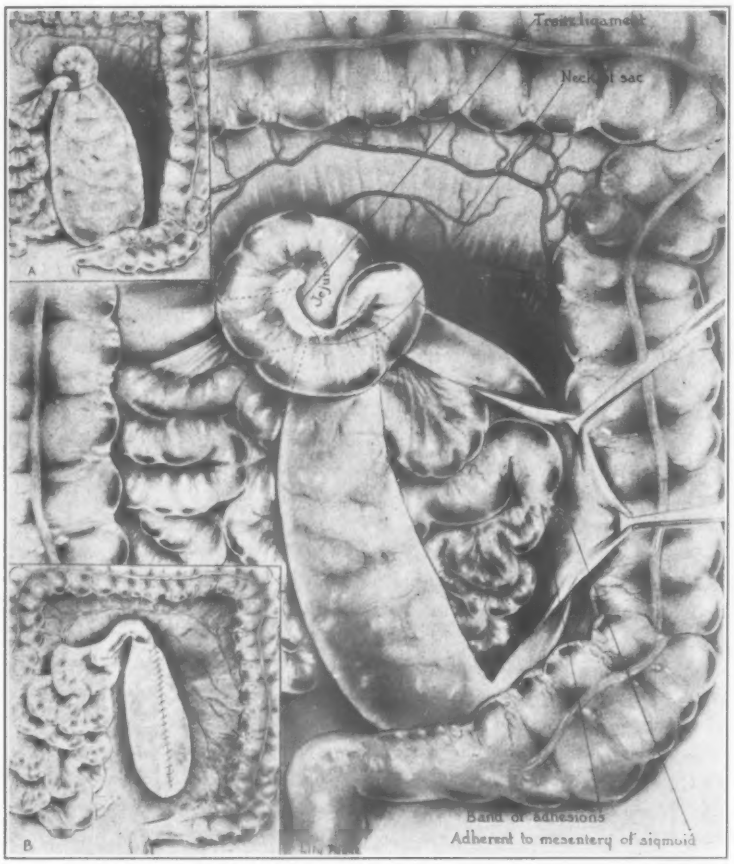
Moynihan states that the left para-duodenal hernia occurs in the fossa of Landzert, or para-duodenal fossa. To quote: "In its typical form, seen most frequently in the foetus or the newly born, the fossa may be thus described. It is situated to the left, and some distance from the ascending limb of the duodenum. The fossa is caused by the raising up of a fold, the plica venosa, by the inferior mesenteric vein—a fold which may be not inaptly described as a mesentery of that vein. Behind, the sac is bounded by the parietal peritoneum, covering the psoas, the renal vessels, the ureter, and portion of the left kidney. The plica venosa consists of a vertical and a horizontal portion, the vertical being to the left and below the fossa, and the horizontal bounding the fossa above. The inferior mesenteric vein forms a bow-shaped curve as it arches over to the right above the duodenal-jejunal flexure."

Cofer and Philips state: "The para-duodenal fossa, described in 1871 by Landzert, lies to the left of the ascending limb of the duodenum and is bound above by a fold containing the left colic artery; below

by a mesocolic fold, and to the right by the mesentery of the small intestine."

Numerous theories have been advanced as to the origin of these fossae, namely: Formation of pockets during intestinal rotation; fusion folds formed during foetal life; elevation of the peritoneum by blood vessels; physiologic adhesions as advanced by Toldt; failure of the root of the mesentery to unite with the posterior abdominal wall. Pan in 1935 showed that the formation of the blood supply to the colon during foetal life has some definite relation to the formation of these folds and fossae.

Moynihan describes these characteristics as being invariably present in left-sided hernia: (1) The presence of the inferior mesenteric vein in the neck of the sac, the extent of the margin formed by the vein being variable. (2) "The hernia spreads in the outward direction towards the descending mesocolon or upward into the transverse mesocolon or both." (3) The hernia sac consists of a single layer of peritoneum. The posterior parietal peritoneum is closely united to the wall of the sac; thus the hernial contents will have two layers of peritoneum in front of them and one layer behind.



The drawings show the hernia with the transverse and descending colon being retracted. The drawing in the left upper corner shows the hernia sac before it was opened. The drawing in the center shows the sac after it was opened and shows the point of obstruction. The drawing in the left lower corner shows the sac after the hernia has been reduced and the sac has been closed.

The condition has rarely been diagnosed before operation. Kummer in 1921 first visualized a left intra-abdominal hernia by X-ray. Alexander in 1937 reports five cases in which correct diagnosis was made by X-ray. Several of the reported cases were found at autopsy or in the anatomical laboratories.

The majority of the clinical cases of intra-

abdominal hernia have presented the signs and symptoms of acute intestinal obstruction. Some of these cases have been chronic. In certain instances a definite mass has been felt. In the chronic cases, the symptoms may simulate chronic duodenal ulcer. In the case here reported symptoms always occurred while the patient was standing and he would obtain immediate relief on reclining. This was the striking symptom to me, as it has been noted in several other reported cases. The majority of cases have occurred in the male sex.

The treatment of the condition is surgical with reduction of the hernia and obliteration of the sac.

CASE REPORT

The patient was a white male machinist, age twenty-eight. He was admitted to the Union Memorial Hospital, Baltimore, Maryland, June 15, 1937. Family history was of no importance. He complained of severe pain in left side of his abdomen of one hour duration, associated with nausea and vomiting. He stated that during past four years he had had numerous attacks of severe pain in his lower abdomen just to the left of his umbilicus. The pain radiated downward into his scrotum. About three years ago he entered a hospital where he had many diagnostic tests, including a gastro-intestinal series, which was reported as negative; and was told he had rheumatic fever and was advised to have his tonsils removed, which he did with no relief. He complained of some shortness of breath and palpitation for past four years. No precordial pain, and no orthopnea or ankle edema were noted. Physical examination showed a well-nourished and well-developed man. There was a soft blowing systolic murmur heard over the aortic area. Heart was enlarged to 1 cm. outside the mid-clavicular line and down as far as the sixth interspace. Blood pressure was systolic 94, diastolic 58. His abdomen was negative except for some tenderness below and to the left of umbilicus. Otherwise his physical examination was negative. His urinalysis was entirely negative. Leukocytes were 8,800, with 86 per cent polys. Non-protein nitrogen was 26, blood sugar 71.4. Wassermann was negative. An electrocardiograph was done on June 15, 1937, which showed first degree heart block typical of type seen in rheumatic heart disease. Intravenous urography and barium enema were reported as showing normal kidneys and normal large intestine.

The patient remained in the hospital five days. Temperature rose to 100 degrees each day. He was discharged on June 15 with diagnosis of rheumatic heart disease and unexplained abdominal pain.

He returned to Out-Patient Department on June 28, 1937, on which date I first saw the patient. On this date the history was obtained that all his attacks had occurred while standing and that he could obtain relief upon lying down or bending forward while sitting. He was readmitted to the hospital on June 29, 1937, and a gastro-intestinal series done on June 30 was reported as follows: "No evidence of a lesion in the esophagus, stomach or duodenum. Six hour examination indicates normal motility. At twenty-four hours the barium was distributed throughout the colon. The appendix is not visualized. There is some tenderness several inches medial to the descending colon at approximately the level of the fifth lumbar vertebra and the top of the sacrum." His urinalysis was negative. Leukocytes were 6,000 with 78 per cent polys. Physical examination same as on previous admission.

On July 3, 1937, an exploratory laparotomy was done. The abdomen was entered through a left rectus muscle splitting incision. On opening the peritoneal cavity, a large mass was seen which filled the left side of the abdomen. It was adherent to the mesentery of sigmoid. On further exploration, it was seen that this mass was an internal hernia. The sac was opened. At the point where the sac was adherent to mesentery of the sigmoid, there was a band of adhesions around the small bowel, causing a partial obstruction. The bowel was dilated above this point and contracted below. These adhesions were divided. The hernia sac was emptied of its contents. Part of the sac was cut away and the remaining part was closed, this being sutured to the posterior peritoneum in its closure. The abdomen was closed in layers with catgut. The post-operative course of the patient was uneventful and he was discharged from the hospital on July 17, 1937.

The patient was followed in Out-Patient Department until September 14, 1937, at which time he was discharged. He was last heard from in August, 1938, well and working.

CONCLUSION

Intra-abdominal hernia is a rare condition whose surgical importance must not be overlooked. The diagnosis may be obscure except for one characteristic and significant symptom—that the pain, however

severe when standing, is relieved when the patient lies down.

I am indebted to Dr. Harvey B. Stone, of Baltimore, for his help and advice with this case.

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PLACENTA PREVIA.*

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Implantation of the placenta in the lower uterine segment is regarded as one of the most serious complications to be met with in the practice of obstetrics. The development of our scientific knowledge of placenta previa, its etiology, and the accepted methods of treatment will be discussed in this paper.

In the *classification* of placenta previa there are three varieties: first—*central*, where the placenta covers completely the internal os; second—*partial*, where part of the opening of the cervix is covered by placenta; third—*marginal*, where a part of the placenta is implanted in the lower uterine segment but the edge does not extend beyond the margin of the internal os.

Placenta previa is known to the laity as the condition in which "the after-birth lies ahead of the baby". This is a fairly accurate description of the mechanics involved, except that it is not the advance of the fetus which ploughs loose the placenta but the widening of the lower uterine segment which retracts and tears the wall of the uterus away from the placental attachments.

The incidence of placenta previa varies in different localities. Over a period of twenty years, out of 59,321 deliveries at the Sloan's and Woman's Hospital in New York City there were 400 cases of placenta previa, making the incidence 1 in 148 cases.

Etiology: The exact etiology is not known. A large number of women have had previously some endometrial disease or disturbance, the result of abortion, manual removal of the placenta, or traumatic manipulation. Multiparae are affected about ten times as frequently as primiparae. Chronic endometritis is suggested as a possible causative factor. There are numerous theories as to the etiology of placenta previa. Strassmann suggests one of the most reasonable theories that we have. He said that an endometrium with chronic inflammatory changes or with premature senility and atrophy presents so poor a vascular bed for the placenta that the latter is obliged to spread out over a proportionately larger surface in order to receive sufficient blood supply for fetal needs. This increases the likelihood of its encroachment upon the internal os.

Symptoms: Painless hemorrhage is the first and most characteristic symptom. This occurs as a rule in the last trimester of pregnancy, and usually in the eighth month. Hemorrhage may follow some form of traumatism, as from coitus, a vaginal examination, or a fall. More often, however, it appears without the slightest warning, either while the pa-

*Read before the Norfolk County Medical Society, January 23, 1939.

tient is occupied with ordinary household duties or even when asleep.

Diagnosis: Hemorrhage without pain at any time in the last three months of pregnancy should suggest placenta previa. Abdominal examination may show some type of malpresentation, but most often the fetus is presenting normally. As a rule, fetal heart sounds are unaffected by placenta previa. An effort to impress the head into the pelvic brim discloses the presence of an indefinite mass or obstruction which prevents its engagement. If the head is found to be engaged, the bleeding is unlikely to be from a placenta previa.

X-ray visualization of the placenta or of the placental site in the uterine wall has been attempted as an aid in diagnosis, but no practical method of direct visualization has yet been developed.

In the diagnosis other sources of bleeding should be kept in mind; for example, premature separation of the normally implanted placenta, polyps, varicose veins, the bladder, carcinoma of the cervix. Since premature separation of the normally implanted placenta is usually manifested by the evidence of hemorrhage and by severe and continuous abdominal pain, it is to be differentiated from placenta previa in that the latter occurs with painless hemorrhage.

Examination of the Cervix in Placenta Previa: The cervix is usually much enlarged, soft and spongy, and the external os and canal readily admit one or two fingers. The finding of a rigid canal and internal os suggests that there is no placenta previa, because a placenta so located engorges the site with blood, making it soft and succulent. Vaginal examination establishes the diagnosis of placenta previa. The examiner should have everything in readiness to intervene should there be a sudden hemorrhage following the examination.

Mortality: The maternal mortality is high and the fetal death rate higher. In the past ten years there has been some diminution in the general death rate, due to earlier diagnosis, better pre-operative and operative procedures, including blood transfusion and Cesarean section.

Treatment: The most significant advance in the treatment of placenta previa has developed in the past quarter of a century. In this time the better appreciation of the consistent treatment of this complication is based on the following sound surgical principles: *First.*—The prevention of infection. *Second.*—Prevention of unnecessary hemorrhage, and adequate replacement of blood loss by transfusion. *Third.*—Avoidance of unnecessary trauma by too many vaginal examinations for the purpose of diagnosis, and from poor operative technique in the treatment.

The use of the vaginal pack to control the bleeding is mentioned mainly to condemn, because it does not control but serves merely to conceal the bleeding; it may further separate the placenta, and it is a potent source of infection in many of these cases.

Pregnancy should be terminated as soon as the diagnosis has been established to safeguard against any further hemorrhage which may prove fatal. Williams said, "There is no single method of treatment applicable to all cases". In the patient's home where facilities for transfusion and operative means or procedures for delivery are lacking the bipolar podalic version of Braxton Hicks offers the best outlook for the woman who has a central or lateral placenta previa. The fetal mortality is high with this procedure.

The patient and her baby in the hospital have a far better outlook. Her general physical status should be estimated, blood pressure checked and blood count made; prospective donors should be grouped and matched with the patient's blood for a probable transfusion. A prophylactic transfusion should be given (500-750 cc.) prior to undertaking any operation whenever the patient's condition makes it advisable.

In a marginal placenta previa simple rupture of the membranes may be sufficient if the cervix is dilating, the bleeding not excessive and the patient not yet affected by the loss of blood. If the bleeding is not stopped the introduction of a Voorhees' or Barnes' bag should be tried. Even with a lateral placenta previa this is an excellent procedure. Rupture of the membranes should always precede the insertion of a bag in placenta previa. Rupture of the membranes is rarely successful unless the patient is in labor. The use of a bag through an undilated cervix in a patient who is not in labor and who is not bleeding is not as safe for the baby as an abdominal section. The risk to the mother is added bleeding which the abdominal operation does not entail. In exceptional cases of a rigid cervix the bag merely stops the bleeding and is often expelled only to cause more bleeding, while the operator is unable to effect a prompt delivery. Mal-positions or mal-presentations are common sequelae of the use of bags for any purpose,

so that version is usually necessary. In all cases of vaginal delivery the application of an abdominal binder which can be tightened as the delivery progresses will prove helpful as an aid in controlling bleeding.

Titus advocates the application of a Willetts' forceps for direct application to the infant's scalp, after which a weight is suspended from the handle as a substitute for a bag in these cases. The advantage it offers over a bag is that it impacts the head, thus tamponing and checking hemorrhage and also avoiding mal-presentations.

In the treatment of central placenta previa, if the child is dead or so premature as not to be viable, the bipolar version of Braxton Hicks is the best procedure to select. On the other hand, if the fetus is viable Cesarean section offers the most promising outlook for mother and child.

The advantages claimed for delivery by Cesarean section in most cases of central placenta previa and in certain selected cases of partial and marginal varieties are that, first, delivery without allowing the lower uterine segment to dilate tends to retain the limited hemostatic power which it possesses; second, delivery is quickly accomplished, reducing blood loss before and during delivery. Hemorrhage can be more promptly and positively controlled; third, Cesarean section, particularly with incision in the lower uterine segment, allows inspection of the placental site. Active bleeding from sinuses can be controlled by suturing and packing under direct vision; fourth, undesirable or dangerous complications resulting from trauma or vaginal delivery are avoided; fifth, maternal morbidity and infection, the result of manipulation and contamination by vaginal procedures, is eliminated; sixth, fetal mortality, especially in placenta previa, is reduced.

To summarize, it may be stated that:

1. Placenta previa constitutes one of the most serious complications to be met with in obstetrical practice.

2. Patients should be treated with the sound thought of preventing infection, unnecessary hemorrhage, surgical shock and excessive trauma.

3. Blood transfusion offers the most effective means to replace the blood loss and in preventing surgical shock from acute hemorrhage.

4. Adequate replacement of blood to combat shock and overcome any loss of blood should precede any delivery by vagina or Cesarean section. Prophylactic transfusion to combat any serious complication of hemorrhage during delivery may prove life saving.

5. Cesarean section is a valuable means of delivery of patients with central placenta previa and selected cases of marginal and partial placenta previa. Cesarean section has aided strikingly in reducing fetal mortality.

6. Transfusions following the delivery may reduce the occurrence and danger of post-partum complications by combating the anemia and improving the general condition of the patient.

7. For the safety of the patient she should be transferred to the hospital once the diagnosis is made.

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THE CHEMISTRY OF INTELLIGENCE.

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The chemical aspects of mental activity depend upon two factors: the chemical make-up of the brain tissue and the chemical composition of the blood which nourishes the brain.

The brain is an organ made up of many parts, each different in structure and function, yet harmoniously integrated into a unit of amazing versatility. In its last analysis the brain is a chemical compound which depends upon chemical reactions for its function. Among the many chemical compounds that enter into brain function may be mentioned calcium-magnesium and sodium-potassium ratios, hydrogen ion concentration and oxidation. Too great a shift from equilibrium in any one of these chemical systems results in manifestations of brain function disturbance.

Drs. Leo Alexander and Abraham Myerson carried out a series of chemical estimations of brain tissue, employing the spectroscope in their studies. The following facts were brought to light:

1. The normal cerebral gray matter of the human adult is richer than the white matter in iron, calcium, magnesium and sodium, while normal white matter is richer in phosphorus.

2. The brain of the new-born human infant is richer in most elements, but poorer in iron, than that of adults.

3. In edema of the brain there is an increase in sodium and calcium.

4. In disturbed brain function there is a decrease in minerals.

Dr. Helen Hopkins, very much interested in the chemical substance known as cholesterol, found that in cases of disturbed brain function there was a decrease of this substance. Other investigators have found that chemical examination of the brain in cases of mental disturbance has indicated deficiencies in neutral sulphur and catalytic iron.

The efficiently functioning brain also requires proper amounts of water and oxygen. Disturbance in the water balance in the brain results in altered function. Too little or too much water is disastrous, not alone resulting in decreased mental efficiency, but when this balance is profoundly upset, resulting in more serious symptoms such as stupor, coma and delirium. Water holds the essential chemicals in solution and in the required amount of concentration, and a shift in either direction may result in an upset of brain function.

The water balance in the brain is also intimately bound up with the acid-base equilibrium. Too much acidity or too much alkalinity is almost immediate in its effects upon the brain. The epileptic brain is an alkaline brain, and a brain given to convulsions and confusion in thought. On the other hand, the diabetic brain is an acid brain with a similar decrease in the processes of mentation. If the acid ions are too concentrated the function of the brain is brought to a standstill with resultant stupor and later coma.

Oxygen is a most important element in the brain as far as intelligence is concerned. This fact came to light in a most interesting manner. In 1862, the meteorologist Glaisher and the Balloonist Coxwell made a famous ascent. In forty-eight minutes they reached an altitude of 28,000 feet, when Glaisher found that he could no longer read his thermometer or his watch. Coxwell noticed his companion's condition and brought the balloon down.

A similar thing happened to Tissander who, when he ascended to a height of 26,000 feet, was overcome by stupor. He found that "body and mind became feebler, little by little, gradually and insensibly." These were the first studies on the effects of decreased oxygen in the brain and intelligence. They were crude beginnings, but they served as a starting point.

A more scientific study of the effects of oxygen deprivation on the brain were made by Drs. Haldane and Kellas. They entered a steel chamber and the air was pumped out until the pressure reached 320 mm. Hg. which is equivalent to 24,500 feet. At this point Haldane's mental reactions became so impaired that he could no longer write or make observations. His reply to all questions was "keep it at 320."

After an hour and a quarter their associates outside the chamber became worried and put messages up to the window, but Kellas only smiled and Haldane gave the same answer, "Keep it at 320." These were obviously the reactions of persons with impaired intelligence, artificially impaired by lack of oxygen.

Finally, Kellas raised the pressure to 350 mm. which is equivalent to 21,500 feet. This meant more oxygen was avilable. And it meant that some of their mental capacities were returning, but evidently not all, for Haldane took up a mirror to examine his lips, looking at the back instead of the front of the mirror.

Then the pressure was raised to 450 mm. (14,500 feet), and Haldane's mind cleared as more oxygen became available. He had been entirely unaware of the passage of the hour and could not recall anything that had occurred during this time.

Dr. Barcroft also evaluated the effects of oxygen on intelligence by spending six days in a glass chamber in which the partial pressure of oxygen varied, corresponding to altitudes from 10,000 to 18,000 feet. There were minor changes in the performance of simple mental tests of memory, multiplication and discrimination. He could not make the necessary discriminations in gas analysis, yet could carry out clear commands if they were given for each moment. There was distortion of judgment and value, and matters of vital importance appeared trivial.

Another scientist who made tests on the effects of decreased oxygen availability was Dr. Lawson who

gave five subjects tests for speed of sorting, speed of tapping, accuracy in aiming, substitutions, analogies, distorted sentences and the same-opposite test. He noticed that the average alterations in behavior were not significant until the percentage of oxygen reached 50 per cent of normal, but at that point the changes were rapid and pronounced. All subjects noticed difficulty in reading at the lower percentages, due chiefly to impaired comprehension and concentration, as well as to physiologic disturbances such as headache.

Similarly, Dr. Tanaka by experimentation found that the deficiency in mental and physical work is due chiefly to lack of oxygen, that there were great individual differences, that the effect is more marked in the mental than the physical work, that there is a critical point where a sudden change occurs (at about 428 mm. Hg., or 15,000 feet) and that the quality of the work is most affected, i.e., greater fluctuations occur in the accuracy of performance than in speed.

The most recent work on the chemistry of oxygen and intelligence was done by Dr. S. H. Kraines, who subjected thirty persons to tests involving decreased oxygen availability and mental activity. His results are thus summarized:

There is a definite drop in intelligence (as measured by the army alpha test) while breathing 10 per cent oxygen (corresponding to an altitude of 20,000 feet). The decrease in score varies greatly with the subject, varying from a minus 1 to a minus 54. Only one subject increased his score under diminished oxygen intake.

The first part of the test showed no loss in score under oxygen lack in spite of the increased number of errors. This was attributed to the respiratory and circulatory adjustments which compensated for the lack of oxygen.

The subjects with the highest scores showed the greatest drop in score under oxygen lack.

The increase in number of errors, in general, paralleled the decrease in score.

Subjective evaluations of one's own abilities while under low oxygen tensions are wholly inadequate. Many subjects who thought there was little effect, did poorly and *vice versa*.

The second factor in the chemistry of intelligence is the chemical make-up of the blood that feeds the brain. Within the past few years methods have been developed to study the biochemistry of brain blood in a really scientific manner. Drs. Abraham Myerson and Roy D. Halloran, in 1927, described a new method for studying the brain metabolism in health and disease by puncture of the internal jugular vein. A few years later a technic was evolved in which the carotid artery was punctured to enable them to investigate the changes that take place in the chemistry of the blood as it enters and leaves the brain. It seems logical that a study of the blood directly before entering and immediately after leaving the brain, before admixture with the blood from other parts of the body, might give information as to brain activity.

Drs. Myerson and Halloran found that sugar disappeared in the transit between the internal jugular vein and the carotid artery. This means that the brain requires sugar for its proper function. Too little or too much sugar in the blood supply to the brain results in altered brain function. Dr. Katzenelbogen has shown that increased sugar metabolism by the brain is manifested in various types of insanity. Too little sugar in the blood flowing to the brain results in reduced mentation.

The mineral composition of the brain blood is also of value in giving us an inkling into the problem of intelligence. Calcium and phosphorus are required for the maintenance of normal irritability of all nervous tissue. In cases where these elements are decreased there is a resultant sluggishness of the mental processes. Where they are increased there is an impulsive over-activity of mentation and confusion. These minerals are increased in cases of insanity of almost all types.

Dr. Walter Freeman, who has been a student of brain function for a great many years, some eight years ago read a paper before the Section of Nervous and Mental Diseases of the American Medical Association in which he discussed the implications of psycho-chemistry. Psycho-chemistry is a very recent science; it involves the chemical evaluation of the mental processes.

Mentation or thinking is essentially a chemical process. It is a rather complicated chemical process which involves, among many others, the consideration of electric potential, oxidation-reduction, aggregation and dispersion, hydration and dehydration, sodium-potassium and calcium-magnesium ratios and hydrogen ion concentration. These must function within normal limits, and too great a shift of any of these in either direction is manifested in disordered function of the brain.

Perhaps the two main chemical processes involved in brain function are the utilization of sugar and oxygen. Both are found in the chemical make-up of the brain, and both are brought to the brain by its blood vessels. Sugar requires oxygen for its conversion into lactic acid, in which form it is still further broken down. Required also for this essential chemical reaction are iron, manganese and copper, which are found in considerable quantities in the brain.

The chemistry of intelligence is by no means completely understood. However, it is known that sugar and oxygen appear to be the main requisites with the catalysts, iron, copper and manganese to help the chemical reaction along. Thinking and intelligence, therefore, may be said to depend upon the breaking down of sugar in the brain in the presence of oxygen. If any of these two elements is notably decreased, utter stupidity is the invariable results.

Dr. Albert P. Mathews, Professor of Biochemistry in the University of Cincinnati, has speculated interestingly on the chemistry of thought: "Are our thoughts also at the bottom electrical? Whenever a nerve impulse sweeps over a nerve it is accompanied by an electrical disturbance, and this disturbance is the surest sign of life. When the nerve impulses play back and forth over the commissures of the brain they are accompanied by this pale lightning of the negative variation. Is that pale lightning what we recognize as consciousness in ourselves? It would seem that there must be some psychic element in every electron if the atoms are made of electrons. There must be some psychic disurbance in every union of hydrogen and oxygen to make water and in every pulse of light and of the wireless telegraph. When an electron moves, it generates a magnetic field; does it also generate a psychic field?"

These thoughts go into the atomic chemistry of mentation, a field which as yet has not been tapped. However, some interesting beginnings are being made. Perhaps the recently perfected electro-encephograph will give us a better insight into the electro-chemical basis of intelligence.

2069 East Twenty-Third Street.

JOHN SNOW'S WORK ON CHOLERA.

WILEY A. PRESTON, B.S.,
Medical College of Virginia,
Richmond, Virginia.

This paper was one prepared by a sophomore student in the Medical College of Virginia as a term essay on an assigned subject in Preventive Medicine and Public Health. It is of value to the average medical man because it shows how a practicing physician could, by his own unaided powers of observation, throw light on the epidemiology of cholera, even before the organism had been discovered. His work has not been improved upon to the present day and is now recognized as a classical example of good epidemiological procedure.—EDITOR'S NOTE.

John Snow was born in England in 1813. He started his medical education as an apprentice to Mr. William Hardcastle, surgeon. He first became interested in cholera in 1831 when he was sent to New Castle to attend the suffering. In 1836 he entered the Hunginton School of Medicine in London. By 1838 he had passed his examinations and was qualified in medicine. Later he attended the University of London, from which he received his M. D. degree in 1843.

In 1848 Dr. Snow began his study of the propagation of cholera. He considered that the cause must be a poison acting on the alimentary canal through direct contact with the canal mucosa. This view led him to consider the nature of the poison and the possible media through which it could be conveyed. This in turn led him to consider water as the chief medium of transportation. So thoroughly had he studied water as a medium of transportation and so thoroughly was he convinced in this, that during the epidemic of cholera in London in 1854 he advised the removal of the pump-handle of the water supply as the grand prescription. The pump-handle was removed and the plague immediately subsided.

In his further studies he noted that the disease traveled by the great tracks of human intercourse, never going faster than the people traveled. In extending to a fresh island or continent it always appeared first at a seaport. It never attacked the crew of a ship going from a country free of cholera to one where the disease was prevailing, but often did the reverse.

The systemic symptoms of the disease he attributed to the great loss of water from the blood, thus altering the composition and function of the blood. He considered that the poison or poison-producing substance was accidentally swallowed and then acted as an irritant to the surface of the stomach and intestines. This caused a withdrawal of fluid from the blood.

He recognized the possibilities of infection resulting from unsanitary living and working conditions, carelessness in handling patients, and from food, as well as from water. He was able to cite numerous cases in support of this belief.

The most terrible outbreak of cholera he studied occurred in the vicinity of Broad Street and Golden Square in London. There were over five hundred persons in ten days and probably more would have died had not the population taken flight. By careful gathering of statistics and careful study he was able to trace the source of infection to the Broad Street well. The well was only thirty feet deep and within a few yards of the sewer which was twenty-two feet deep. The soil being of a gravel and clay nature, he concluded that the well had been contaminated by the seepage of the sewage. The water had a foul odor and taste and a film formed on the surface after it was kept a few hours. This was the well in which the pump-handle was removed, after which immediate improvement was apparent.

By taking statistics of deaths from cholera in relation to water supplied by different companies, he was able to show that there were more deaths per 100,000 population in those supplied by impure water. As the various water companies supplied rich and poor in different sections of the city and even on the same street, the possibility of selective error was eliminated. He was also able to show a decline in the incidence of cholera as the water supply was purified.

When cholera returned to London in 1854 Dr. Snow determined to ascertain the exact effect of the water supply on the progress of the epidemic. He wanted to satisfy his own mind and establish for all time the truth or fallacy of his theory. In going about his work, he again gathered and studied statistics on water supply and deaths. He learned that deaths were more prevalent in those houses supplied by the Southwark & Wauxhall Company, than in those supplied by the Lambert Company, although the houses were in the same district and often on the same street, the ratio of the deaths for the two companies being one to fifteen. The Southwark & Wauxhall Company obtained water from the Thames River in which the sewage was disposed, while the Lambert Company had a raw water supply free from sewage. This evidence seemed sufficient to involve definitely the water supply, but he did not make any definite conclusions. Instead he studied conditions in other English towns, also in Paris and Moscow. With each study he was able to show that the prevalence of the disease was connected with contaminated water supplies.

In studying the statistics he noticed that about 27 per cent of the deaths were in children under fifteen years of age. He concluded that this high proportion was due to the fact that children are very fond of water, especially in the warmer seasons.

With the completion of his study Dr. Snow was so convinced of the truthfulness of his theory that he formulated the following rules for the prevention of cholera:

1. Strictest cleanliness should be observed by all who contact the sick.
2. Careful handling and cleaning of soiled bed linen.
3. Care taken that water for internal use does not become contaminated.
4. When disease breaks out all provisions should be thoroughly cleansed.
5. Isolation of sick patients.
6. More sanitary conditions in coal mines.
7. Educate the public as to the communicability of cholera.
8. Effect food and proper drainage.
9. Free water of contamination.
10. Better living condition for the poor.
11. Educate public to practice personal and domestic cleanliness.
12. Segregation of sick people who arrive in ships.

He said "I feel confident that by attending to the above mentioned precautions, which I consider to be based on a correct knowledge of cholera, this disease may be rendered extremely rare, if indeed it may not be altogether banished from civilized countries."

After nearly one hundred years we are living in a civilization that experiences the fulfilment of this prophesy.

Public Health Statistics

I. C. RIGGIN, M. D.
State Health Commissioner of Virginia

The report of the Bureau of Communicable Diseases of the State Department of Health for August, 1939, compared with the same month in 1938, follows:

	1939	*1938*
Typhoid and paratyphoid fever	94	76
Diphtheria	83	96
Scarlet fever	50	34
Measles	80	108
Meningitis	1	2
Poliomyelitis	6	12
Rocky Mountain spotted fever	9	11
Typhus fever	1	1
Undulant fever	1	6
Tularemia	5	6

PRELIMINARY REVIEW OF VITAL STATISTICS IN VIRGINIA FOR 1938

Total number of births in Virginia in 1938 shows an increase for the second consecutive year. The number recorded for 1938 is 53,380, with a rate of 21.6 per 1,000 population, in comparison with 51,791 (rate 21.0) for 1937. White births in 1938 totaled 38,343 (21.1); colored totaled 15,037 (rate 22.9). Deaths decreased from 31,092 in 1937 to 29,560 in 1938. The total death rate was 12.0 per 1,000, with a rate of 10.6 for whites, 15.7 for colored.

Infant mortality for the year, 66.1 infant deaths per 1,000 live births, was lower than that of 69.8 in 1937. Maternal mortality, too, shows a slight decrease from previous years. The death rate from puerperal causes in 1938 was 5.3 per 1,000 live births, due to a total of 283 deaths, while rates in 1937 and 1936 were 5.6 and 5.8, respectively.

Inspection of the figures under the various causes of death shows rates for poliomyelitis (0.4) and epidemic meningitis (1.9) per 100,000 population to be the lowest for those causes since 1934. The rate for typhoid fever (2.3) was the same as in 1937, the lowest ever recorded in Virginia for that disease. The 1938 rates for measles (4.2), diphtheria (4.9), whooping cough (8.4), and diarrhea and dysentery under two years (21.0), however, were all slightly higher than in 1937.

The seven leading causes of death in 1938 are the same as in previous years, although the order is somewhat changed. Deaths from diseases of the heart are still in the lead (rate 259.8 per 100,000 population) with cerebral hemorrhage (108.2) following. The most striking decrease is noted in deaths from pneumonia. This cause dropped from third place in 1937 to fifth in 1938, with a decrease of 513 deaths. Nephritis, although showing a slightly lower figure than in 1937, rose from fourth to third place. The accident death rate (82.0) was definitely lower than in 1937, dropping from fifth to sixth place in 1938. Reduction in automobile fatalities accounted for 148 of the 161 decrease in accidental deaths between 1937 and 1938. Cancer rose from sixth to fourth place in 1938. Tuberculosis (all forms), with a slightly higher rate of 73.2 in 1938 than the 71.3 in 1937, still holds seventh place. Deaths from the seven leading causes in 1938 are listed below, with rates per 100,000 population:

	No. Deaths	*Rate*
1. Diseases of the heart	6,419	259.8
2. Cerebral hemorrhage	2,673	108.2
3. Nephritis	2,349	95.1
4. Cancer	2,206	89.3
5. Pneumonia	2,109	85.4
6. Accidents, total	2,025	82.0
7. Tuberculosis (all forms)	1,809	73.2

New Members

New members of the Medical Society of Virginia, since the list published in the April 1939 issue of the MONTHLY, are:

Dr. Charles Varner Amole, Alexandria.
Dr. Erwin Saul Berlin, Crockett.
Dr. McLemore Birdsong, Charlottesville.
Dr. Kenneth Nathan Byrne, Lexington.
Dr. William Fitzgerald Cavedo, Richmond.
Dr. Fielding Jason Crigler, Charlottesville.
Dr. Joseph Dingus Culbertson, Coeburn.
Dr. William Frederic Delp, Pulaski.
Dr. John William Devine, Jr., Lynchburg.
Dr. Connelly Moore Dobson, Richmond.
Dr. Frank William Foote, Jr., New York, N. Y.
Dr. George Hartranft Haley Garrison, Virginia Beach.
Dr. Joseph Edward Gladstone, Exmore.
Dr. John Milton Gouldin, Tappahannock.
Dr. Hugh Griffin, Dante.
Dr. Willard Wilson Griggs, Norton.
Dr. David Lemuel Harrell, Jr., Petersburg.
Dr. David Orville Helms, Pocahontas.
Dr. Jesse Bruce Hopkins, Bridgewater.
Dr. Frederick Melville Horsley, Schuyler.
Dr. George Mahlon Hutto, Alexandria.
Dr. Frank Aloysius Kearney, Phoebus.
Dr. Vincent Edward Lascara, Norfolk.
Dr. Earle Bailey Morgan, Fincastle.

Dr. James Talton O'Neal, Amelia.
Dr. James Trabue Rountree, Woodstock.
Dr. William Elijah Tomlinson, Jr., Richmond.
Dr. Herman Luther Tutwiler, Patterson.
Dr. Matthew James Walter White, Luray.
Dr. Ayer Crouch Whitley, Palmyra.

Woman's Auxiliary to the Medical Society of Virginia

President—MRS. HAWES CAMPBELL, Venter.
President-Elect—MRS. HENRY A. LATANE, Alexandria.
Corresponding Secretary—MRS. PAUL PEARSON, Aylett.
Recording Secretary—MRS. E. LATANÉ FLANAGAN, 3413 West Franklin Street, Richmond.
Treasurer—MRS. REUBEN F. SIMMS, 2502 Hawthorne Avenue, Richmond.
Chairman, Press and Publicity—MRS. WILBERT E. BUTLER, 217 East Indian River Road, Norfolk.

My Parting Message!

Our year's work is drawing to a close. When this message reaches you, one and all will be packed and headed for our Capital City to attend our State Convention. You have read the program on "our page" of the September issue I know, and aren't you thrilled to see the many interesting events that have been planned for us by our capable Richmond chairman. I want to thank her not only for this but all the many helpful things she has done..

I wish I might grasp each one of you by the hand, look in your face and thank you for the splendid help and hearty cooperation you have given me in carrying on our work, but since I can't do this I am sending you this parting message.

I feel that our work has gone forward in many ways; there is a better understanding of the purpose of our organization; and best of all, our doctors are awakening to what our Auxiliary means to them in many ways, perhaps none greater than in promoting health education through its rightful channel —the profession—and too in helping to restore the family physician to the place of esteem and honor which he once held, but in this rushing age with all its "isms" has been slipping.

Please, may I again take this opportunity to thank one and all from the bottom of my heart, the Board, Miss Edwards, our Advisory Council, every president, officer and member of our groups for the loyal support you have given me, for what progress we have made is due largely to your help and cooperation.

Now that I leave you and our President-elect takes office I beg for her the same interest and help you have given me, and earnestly pray Virginia may soon be a 100 per cent Auxiliary State.

Now meet us in Richmond
The date you well know
There will be fun, food and speeches
So get ready and GO!

Faithfully yours,
(MRS. HAWES) ELLIE COCKE CAMPBELL.

Truth About Medicine

In addition to the articles previously enumerated the following has been accepted by the Council on Pharmacy and Chemistry of the American Medical Association:
Parke, Davis & Co.
Ampoules Adrenalin in Oil, 1 cc.

New and Nonofficial Remedies

The following products have been accepted by the Council on Pharmacy and Chemistry of the American Medical Association for inclusion in New and Nonofficial Remedies:

Immune Globulin (Human).—Fresh, healthy, human placentas, finely ground, are extracted with saline solution and the globulins are obtained from the extract by precipitation with ammonium sulfate. After removal of the salt by dialysis and addition of 0.05 per cent of phenol, the globulin solution is sterilized by Berkefeld filtration. (For a statement of the actions, uses, and dosage see New and Nonofficial Remedies, 1939, p. 412). The product is marketed in packages of 2 cc. and 10 cc. rubber-stoppered vials. Lederle Laboratories, Pearl River, N. Y.

Tablets Ascorbic Acid—Lederle, 0.025 Gm.—Each tablet contains cevitamic acid—Lederle (ascorbic acid—Lederle) (New and Nonofficial Remedies, 1939, p. 415), 0.025 Gm. Lederle Laboratories, Inc., Pearl River, N. Y.

Estrone—Lilly.—A brand of estrone (theelin)—N.N.R. (New and Nonofficial Remedies, 1939, p. 345). It is marketed in the following forms: Amopules Estrone, 0.1 mg. in oil, 1 cc.; Ampoules Estrone, 0.2 mg. in oil, 1 cc.; Ampoules Estrone, 0.5 mg. in oil, 1 cc.; Ampoules Estrone, 1.0 mg. in oil, 1 cc.; and Vaginal Suppositories Estrone, 0.2 mg. Eli Lilly & Co., Indianapolis, Inc.

Estriol—Lilly.—A brand of estriol (theelol)—N.N.R. (New and Nonofficial Remedies, 1939, p. 347). It is marketed in the following dosage forms: Pulvules Estriol, 0.06 mg.; Pulvules Estriol, 0.12 mg.; Pulvules Estriol, 0.24 mg. Eli Lilly & Co., Indianapolis, Ind.

Refined and Concentrated Antipneumococcic Serum, Type I—Lederle (New and Nonofficial Remedies, 1939,

p. 406).—This product is also marketed in packages of one vial containing 20,000 units and one vial containing 50,000 units. Lederle Laboratories, Inc., Pearl River, N. Y.

Antipneumococcic Serum, Refined and Concentrated, Type II (New and Nonofficial Remedies, 1939, p. 407).—This product is also marketed in packages of one vial containing 20,000 units and one vial containing 50,000 units. Lederle Laboratories, Inc., Pearl River, N. Y.

Bivalent Antipneumococcic Serum, Refined and Concentrated (New and Nonofficial Remedies, 1939, p. 409).—This product is also marketed in packages of one vial containing 20,000 units and one vial containing 50,000 units. Lederle Laboratories, Pearl River, N. Y.

Antipneumococcus Serum, Types IV and VIII, Refined and Concentrated (New and Nonofficial Remedies, 1939, p. 411).—This product is also marketed in packages of one vial containing 50,000 units. Lederle Laboratories, Inc., Pearl River, N. Y.

Antipneumococcic Serum, Types V and VII, Refined and Concentrated (New and Nonofficial Remedies, 1939, p. 411).—This product is also marketed in packages of one vial containing 50,000 units. Lederle Laboratories, Inc., Pearl River, N. Y.

Tetanus Toxoid, Alum Precipitated (Refined)—Gilliland (New and Nonofficial Remedies, 1939, p. 436).—Marketed in packages of two 1 cc. and two 0.5 cc. vials each containing one immunization treatment and in packages of one 10 cc. vial and one 5 cc. vial each containing five immunization treatments. Gilliland Laboratories, Inc., Marietta, Pa.

Propaganda for Reform

The Loss of Vitamin C in Orange Juice on Standing.—In connection with the consideration of an accepted product known as V-C-B (*The Journal*, June 10, 1939, p. 2421) the Council on Foods found it necessary to evaluate evidence in support of the common assumption that orange juice may lose considerable vitamin C on standing in the refrigerator. The claim has been made that orange juice diluted with V-C-B solution retains its vitamin C concentration much better than orange juice diluted with water. In support of this contention the firm provided results of tests of the vitamin C content as determined by chemical titration of a number of solutions at different intervals of time. These experiments purported to show that fresh orange juice lost 23 per cent of its vitamin C potency on standing in the refrigerator for twenty-four hours and 34 per cent on standing at room temperature for the same length of time. Experiments performed at the Connecticut Agricultural Experiment Station at the request of the Council do not support this claim. These experiments show that fresh orange juice, under the conditions of the experiment, retained 97.6 per cent of its vitamin C activity after twenty-four hours in the refrigerator; that V-C-B solution diluted with an equal volume of water lost nearly all of its activity when standing at room temperature and lost considerable vitamin C potency on standing in the refrigerator. When mixed with an equal volume of orange juice, the mixture retained its activity fairly well. The results show conclusively that the only effect of fresh orange juice and V-C-B solution on each other is that the orange juice retards the loss of vitamin C in V-C-B. The Council concludes that fresh orange juice loses very little vitamin C potency on standing in the refrigerator, especially if protected from the air, whereas solutions prepared from crystalline ascorbic acid may lose considerable vitamin C potency under the same conditions. (*J. A. M. A.*, June 10, 1939, p. 2420).

Book Announcements

New Books.

The following are recent acquisitions to the Library of the Medical College of Virginia and are available to our readers, the only cost being return postage:

Reynolds, S. R. M.—Physiology of the uterus.

Robinson, G. C.—The patient as a person.

Sakel, M.—Pharmacological shock treatment of schizophrenia.

Severinghaus, E. L.—Endocrine therapy in general practice.

Slonaker, J. R.—The effect of protein in the diet of rats.

Spaeth, E. B.—Principles and practice of ophthalmic surgery.

Walton, R. P.—Marihuana; America's new drug problem.

Wyatt & Fraser.—Effects of monotony in work.

Yearbook of the Eye, Ear, Nose and Throat.

Yearbook of Neurology, Psychiatry and Endocrinology.

Diseases of the Nose and Throat. By CHARLES J. IMPERATORI, M.D., F.A.C.S., Professor of Otolaryngology, New York Polyclinic Medical School and Hospital; Consulting Laryngologist to Nyack General Hospital and Harlem Hospital; Consulting Bronchoscopist to Manhattan Eye, Ear and Throat Hospital, Fifth Avenue and Flower Hospital, and Riker's Island Hospital, New York; etc. And HERMAN J. BURMAN, M.D., F.A.C.S., Adjunct Professor of Otolaryngology, New York Polyclinic Medical School and Hospital; Director of the Department of Otolaryngology, Harlem Hospital; Consulting Bronchoscopist to Broad Street Hospital and Pan American Clinics, New York. Second Edition Revised. Philadelphia. J. B. Lippincott Company. 1939. Octavo of xxi-725 pages. 480 Illustrations. Cloth. Price, $7.00.

In recent years there has been a noticeable increase in the number of textbooks published in the field of otolaryngology. Revised editions of the old line texts have appeared. In addition new names have appeared as authors of textbooks. Among them are to be included the authors of this book.

Theirs has been a real contribution in the field.

It can not be said that they have gone unappreciated. Already the demand for a second edition has arisen.

The plan of the book is orderly and logical. Each chapter begins with an outline of the subject discussed in it. Then the matter is presented in a terse, synoptic style which facilitates both the acquisition and the retention of the facts.

New chapters have been added by specialists in their respective fields on X-ray examination, radiotherapy and laboratory methods.

The book is written from a practical standpoint. In it are to be found procedures and helpful hints for treatment not available in any other text.

It should find a well deserved place in the library of the general practitioner interested in this field, and in that of the specialist.

EMANUEL U. WALLERSTEIN, M.D.

Otolaryngology in General Practice. By LYMAN G. RICHARDS, M.D., Fellow in Otology, Courses for Graduates, and Assistant in Surgery, Harvard Medical School; Associate Professor of Otolaryngology, Tufts Medical School, etc. With a Foreword by D. HAROLD WALKER, M.D., Professor Emeritus of Otology at Harvard Medical School; Past President of American Otological Society. New York. The Macmillan Company. 1939. Octavo of 352 pages. Illustrated. Cloth. Price, $6.00.

The purpose of this book is to aid the general practitioner in a better understanding of the commoner problems of otolaryngology met with in every day practice. The volume consists of 331 pages and 22 chapters which are rich in substance, and devoid of duplication and technical discussions. While the illustrations are not profuse and elaborate, they are concise and accurate. The typographical form is pleasing and the author's style lends itself to enjoyable reading.

The chapter on respiratory obstruction is particularly informative, not only to the general practitioner, but should be of much interest to the trained specialist as well.

The significance of hoarseness is well emphasized in chapter nineteen and this alone should do much to acquaint the general profession with the importance of recognizing early symptoms of laryngeal malignancy.

This is a valuable contribution for the busy practitioner.

E. TRIBLE GATEWOOD, M.D.

Operative Gynecology. By HARRY STURGEON CROSSEN, M.D., Professor Emeritus of Clinical Gynecology, Washington University School of Medicine; Gynecologist to the Barnes Hospital, St. Louis Maternity Hospital, and St. Luke's Hospital; Consulting Gynecologist to De Paul Hospital and to the Jewish Hospital. And ROBERT JAMES CROSSEN, M.D., Assistant Professor of Clinical Gynecology and Obstetrics, Washington University School of Medicine; Assistant Gynecologist and Obstetrician to the Barnes Hospital and the St. Louis Maternity Hospital; Gynecologist to St. Luke's Hospital and to De Paul Hospital. Fifth Edition. Entirely Revised and Reset. St. Louis. The C. V. Mosby Company. 1938. Octavo of xxxii-1076 pages. Twelve hundred sixty-four illustrations including three color plates. Cloth. Price $12.50.

During the seven years since the last edition there have been great changes in gynecologic practice. The authors, recognizing the strides in our knowledge of endocrinology and the application of short wave diathermy, have further limited their indications for radical pelvic surgery, particularly in the field of pelvic inflammatory disease. Radical operations in the female pelvis based on vague indications are strongly condemned. The authors point out definite indications for certain operations and show how the operative technic must be adapted to the pathology in each individual case. For example eighteen different operations for retrodisplacement of the uterus are described along with some fifty modifications of these operations. The illustrations are unexcelled by any book dealing with this subject.

One-fourth of the book is devoted to care of the patient, pre-operatively, post-operatively, and to auxiliary treatments. Much stress is placed upon the careful selection of the patient as a risk for the proposed operation. Again the authors emphasize the necessity of bringing the patient up to the highest point of well being and then adopting the operative procedure best suited to the particular risk. The means of attaining these objectives are set down in detail. The post-operative care is described with minute detail, providing the reader with a workable mass of information.

A chapter on anesthesia puts much stress on Novocaine infiltration and considerably extends the indications of this anesthetic agent. The new inhalation anesthetics are discussed and some reference is made to the pharmacologic action of these drugs. There is also a chapter on surgery of the gastrointestinal and urinary tract in so far as it relates to gynecology. This is rather extraneous and is about the same material that has been presented in previous editions.

WILLIAM BICKERS, M.D.

Virginia Medical Monthly

Founded by LANDON B. EDWARDS, M. D., April, 1874
Owned by MEDICAL SOCIETY OF VIRGINIA since November, 1919
WYNDHAM B. BLANTON, M. D., *Editor*
AGNES V. EDWARDS, Richmond, *Business Manager*

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All correspondence regarding editorial matters, articles, advertisements, subscription rates, etc., should be addressed to the Monthly, 1200 East Clay Street, Richmond, Va.

This journal is not responsible for the opinions and statements of its contributors.

All advertisements are received subject to the approval of the Council on Pharmacy and Chemistry of the American Medical Association.

Subscription Price: $2.00 per annum in advance. Single Copies 25c.

VOL. 66. OCTOBER, 1939 No. 10

Editorial

Where Shall We Meet Next Year?

The West Virginia State Medical Association proposes a joint meeting with the Medical Society of Virginia next year at White Sulphur Springs. Our House of Delegates will probably have an opportunity in a few days to accept or decline the invitation. Their decision will rest on their conception of the fundamental purpose of a state medical society.

There are a number of reasons why such a proposal appears attractive. It is a new idea and new ideas are always at a premium. It is a flattering attention from a sister medical society, and the company would be agreeable. It offers an opportunity for our members to take a trip to a famous and delightful resort with all the high class accommodations the place has to offer. It is an opportunity to have a new kind of state society meeting, one in which our members will largely be excused from putting on the show. It is possible that it may actually increase the attendance of members, since the West Virginia society reports a 40 per cent increase since adopting this meeting place and their present type of program. It will, if suggested plans hold, offer an opportunity to hear a battery of some fifteen or more out of state speakers of distinction.

There are, on the other hand, legitimate reasons why such a proposal may not appeal to the members of our Society. Some may want, as in the past, a meeting of their own where the membership can express itself freely. Some will argue that the Tri-State offers an interstate gathering for those who like that kind of meeting, that the American Medical Association, the Southern, and other national and regional gatherings give abundant opportunity to hear the Big Shots, that only our component societies and the State Society offer full and free opportunity for local talent to appear and exchange ideas and information and opinions. Others may think of "The White" as inaccessible to a large fraction of our membership. Still others may regard its daily rate of $9.00 as in excess of their ability to pay. Others may think the expense to our Society (estimated at about $800.00) of bringing a group of out of town speakers together as being too much. To these latter arguments it can quickly be answered that cheaper rates are to be obtained in the village and that the commercial exhibitors can probably finance the Society's increased bill of expense.

While proponents and opponents are being heard from, there will doubtless be delegates who will ask whether the Society has ever met out of the State before, and the meeting in Washington in 1914 over which Stephen Harnsberger presided will be recalled. If it is asked what effect that meeting had on the attendance of members, it will be replied that 265 attended it, while 343 attended the Lynchburg meeting

in the previous year of 1913 and 601 the Richmond meeting in the following year of 1915. If it should be asked whether the Society has ever attempted to meet in any of the Virginia mountain resorts, the answer will be yes—ten times—but not once since 1897. These facts have varying interpretations and admit of diverse conclusions.

The place of meeting for the Society and the program for the meeting will always be subjects of serious consideration by those entrusted with the responsibilities of office. Some persons have contended that the location should always be central and that it should always be in one of the larger medical centers of the State, while others wish to rotate it through the various regional centers of the State. There are tenable arguments on both sides. Some wish a meeting largely given over to outside talent, others prefer a meeting built on local talent almost exclusively. The Program Committee has nothing to do with the place of meeting. It has responsibility enough in the type of meeting to be conducted. It tries to keep its ears to the ground to learn the desires of a majority of the Society. It has often introduced innovations believed to be in the interest of a better scientific meeting but in general its policies have been to stay in the middle of the stream and to date it believes it has touched the shores of neither Scylla nor Charybdis.

Happily there need be no serious outcome of a difference of opinion on this or on any other subject in an organization such as ours which is equipped for and accustomed to arriving at the will of the majority by the workings of a democratic system of representation.

The Marriage Protection Bill.

A premarital examination bill was unsuccessfully offered at the last session of the Virginia Assembly. It forbade the marriage of syphilitics, and was probably too drastic for Virginia consumption. The Committee on Syphilis Control of the Medical Society of Virginia is going to present to our House of Delegates in a few days a much milder bill. It requires as a preliminary to securing a marriage license the filing with the county clerk of a physician's statement that he has caused to be made as to the parties involved a standard serological test for syphilis, a statement of the results of the serological examination of the blood of both parties, and, in case of evidence pointing to syphilis in either party, a statement that he has explained to both parties the nature of the findings and their significance.

It will be seen at a glance that such a law is persuasive rather than coercive, educative rather than punitive. It does not do violence to personal liberty and it will probably go further in reducing the number of marriages involving syphilitics than would more radical measures. While it places upon the physician definite responsibilities it does not make either him or the laboratory the final arbiter of marriage.

Whatever fault may be found with the bill on study and discussion by larger groups and by the public, surely no fault can be found with the tone of the statement which accompanies the Committee's report to our House of Delegates. It seems to us to have the temper and breadth that should characterize the work of all those interested in a better social order.

Proceedings of Societies

The Southwestern Virginia Medical Society

Held its annual meeting in Roanoke, September 21, with the president, Dr. Harry W. Bachman, Bristol, presiding. There was an attendance of seventy-five physicians. The afternoon session was given over to a round table discussion of Hypertension, Nephritis and Congestive Heart Failure, with Dr. J. Edwin Wood, Jr., University, as the leader. At the banquet in the evening, Mr. Holman Willis, Roanoke, gave a humorous address on "Some Reminiscences". Following this, Dr. Arthur M. Shipley, Baltimore, Maryland, gave a surgical lecture.

At the business meeting, the following officers were elected: President, Dr. C. F. Manges, Blacksburg; vice-president, Dr. T. K. McKee, Saltville; and secretary-treasurer, Dr. James P. King (re-elected), Radford. The retiring president, Dr. Bachman, and Dr. J. G. Cox, Hillsville, were elected to the executive committee. Twenty-two new members were taken into the Society.

The Southside Virginia Medical Association

Held its regular quarterly session at the Piedmont Sanatorium, Burkeville, on September 12. The following program was presented: What Message Should the Specialist Carry to the General Practitioner in Regard to the Treatment of Arthritis by Dr. Thomas Wheeldon, Richmond; Allergic Dermatoses by Dr. W. T. Vaughan, Richmond; Penetrating Wounds of the Thorax by Dr. A. V. Crosby, Norfolk; Spontaneous Pneumothorax Simulating Acute Coronary Occlusion by Dr. J. M. Hutcheson, Richmond; and Epituberculosis by Dr. Arnold Strauss, Norfolk.

Dr. C. S. Dodd, Petersburg, is president of this Association, and Dr. R. L. Raiford, Franklin, secretary-treasurer.

The Rockbridge County Medical Society

Met in Lexington on August 29, with the president, Dr. Francis Lee Thurman, of Buena Vista, presiding. The guest speaker for this meeting was Dr. W. W. Waddell, Jr., of the University of Virginia, who gave a talk illustrated with lantern slides. Dr. E. P. Tompkins, Lexington, is secretary of this Society.

News Notes

Last Call for Richmond!

Programs for the Richmond meeting of the State Society were mailed two weeks ago and there is little else to say but that Richmond doctors are waiting expectantly for the arrival of friends from all parts of Virginia as well as from other states. Come—even if you cannot stay for the full time!

In addition to special dinner groups already announced, the following have arranged for a get-together:

The Virginia Obstetrical and Gynecological Society will meet for dinner in the Monroe Room of the John Marshall Hotel, at 7:00 p. m., Wednesday, October 4;

The Virginia Pediatric Society will have a luncheon meeting in Parlor C of the Hotel, at 1:30 p. m., Thursday, October 5, this to take the form of a round table discussion of the endocrines;

Women physicians of the Society are also arranging for a luncheon at Miller and Rhoads, at 1:15 p. m., Thursday, October 5.

These are subscription affairs and those who count on attending are asked to register promptly.

Several scientific and technical exhibits have been added to those listed on the program.

Married.

Dr. Jose D. Coll, Fajardo, P. R., and Miss Ethel Margaret Allen, Churchville, August 5. Dr. Coll is a graduate of the Medical College of Virginia, class of '39, and is now serving an internship at Grace Hospital, Richmond.

Dr. Herman W. Farber and Miss Henrietta Salsbury, both of Richmond, August 30. He graduated from the University of Pennsylvania, Department of Medicine, in 1934.

Dr. Philip Wood Oden, class of 1934, Medical College of Virginia, and Miss Martha Lorraine Sanders, Richmond, September 9. They will make their home in Richmond.

Roanoke Board of Health.

The City of Roanoke has recently created a Board of Health composed of five members, two physicians and three lay members. Dr. W. P. Jackson, was named chairman and Dr. E. G. Gill vice-chairman.

Dr. James T. Rountree

Announces the change of his address from Front Royal to the Cora Miller Hospital, Woodstock.

Dr. E. V. Richardson,

Formerly of Jewell Valley, is now located at Leona Mines, where he is chief physician for the Virginia Iron, Coal and Coke Company for the Monarch and Imperial Mines.

American Public Health Association.

The 68th annual meeting of this Association will be held in Pittsburgh, October 15-20, an attendance of 3,500 being expected. On the 15th, the Sixth Institute on Public Health Education will begin and continue through the 16th, at which time the International Society of Medical Health Officers, the American School Health Association, the Association

of Women in Public Health, and the National Organization for Public Health Nursing, will also meet. There will be six general sessions throughout the week. Among the subjects chosen for these are Medical Care, Cancer, Professional Education, and The American Way as Seen from Abroad. The ten sections of the Association have also arranged programs covering topics of interest to the members. A full program may be obtained from the Association at 50 West 50th Street, New York, N. Y.

The American Academy of Ophthalmology and Otolaryngology

Will hold its forty-fourth annual meeting in Chicago, October 8-13, at the Palmer House. They will present elaborate courses of instruction with more than 100 specialists as teachers—four afternoon programs of motion pictures and a scientific exhibit in addition to its formal scientific program. There will be one joint session at which Dr. George M. Coates, Philadelphia, will deliver his presidential address and Dr. Burt R. Shurly, Detroit, will be introduced as the Academy's guest of honor for the year.

Dr. C. L. Riley,

Who for the past two years has been with the State Department of Health in Manassas, has just located for general practice in Winchester. He is a graduate of the Medical College of Virginia, pharmacy class of 1930, and medical class of 1934, and was a member of the resident staff of the Hospital Division for three years, completing a residency in obstetrics in 1937.

Dr. Cuthbert Tunstall,

Charlottesville, was recently re-elected a member of the City Library Board for a term of five years.

The E. R. Squibb and Sons

Announce the establishment of a new laboratory for the study of filterable virus diseases at New Brunswick, N. J. This laboratory will operate as a unit of the Biological Division and will be headed by Dr. Raymond C. Parker, biologist of the Rockefeller Institute for Medical Research. The new virus laboratory is housed in a specially constructed building and is equipped for work with chick embryos and tissue culture. The actual working quarters consist of a large general laboratory with every facility for chemical and histological work, a general preparation room for washing, drying, packing, and storing the various materials, two special culture and operating rooms provided with filtered ventilation, a spacious incubator room, an animal preparation room, a bleeding room, and ample animal quarters. Visitors may observe every step of the work in progress without entering any of the various rooms of the culture suite.

Dr. Edith J. Lacy,

Class of '25, Medical College of Virginia, who is connected with the Suwarta Hospital at Dhulia, West Khandesh, India, under the Presbyterian Board of Missions, is on a year's furlough in this country and is at present in Louisa County, this State.

Dr. C. Bernard Pritchett,

After practicing for several years at Hampton, has returned to Danville and opened offices at 644 Main Street, where he will limit his work to dermatology and allergy.

Graduate Fortnight.

The New York Academy of Medicine will have its twelfth Graduate Fortnight from October 23 to November 3, inclusive, the subject to be discussed being "The Endocrine Glands and Their Disorders". There will be evening sessions, morning round table conferences, and exhibits at the Academy building, and hospital clinical programs at the various hospitals throughout the city. Registration is limited to the medical profession, the fee for non-members being $5.00. A complete program and registration blank will be mailed on request sent the Academy at 2 East 103rd Street, New York City.

Medical College of Virginia News.

Convocation exercises opening the one hundred second session of the college were held at the old First Baptist Church, September 18, at 11:30 A. M. The laying of the cornerstone of the new hospital also took place in conjunction with these exercises.

Colonel E. W. Clarke, acting commissioner of public works of the Public Works Administration made the principal address. Colonel Clarke was introduced by Honorable James H. Price, Governor of Virginia, who spoke briefly on the place of the college and the new hospital in service to the State. Mr. H. A. Wortham, Regional Director of the Public Works Administration, Atlanta, Georgia, made a brief talk, as did Mr. George E. Snider, president of the student body organization of the college. President Sanger presided at the exercises. Following the exercises at the church the cornerstone was laid with

appropriate ceremonies by the Lewis Ginter Lodge, No. 317, A. F. & A. M.

Dr. J. H. Scherer, assistant professor of medicine, attended the International Conference on Hematology at Madison, Wisconsin, September 4-5-6.

The Public Works Administration has approved a supplemental grant in the amount of $123,056.00 for hospital construction. The total cost of the building when completed will run over $2,000,000.00.

Dr. Sumter S. Arnim has been appointed assistant professor of operative dentistry in the dental school of the college.

Dr. David S. Garner, assistant superintendent of the hospital division, has resigned to accept the position of assistant medical director of the Shenandoah Life Insurance Company, Roanoke, Virginia.

Mr. Byron E. Leach has been appointed research assistant in the department of biochemistry. Mr. Leach received his master's degree from the Virginia Polytechnic Institute last June.

The Richmond Chapter of the American Red Cross has made a grant of $700.00 towards a weekly clinic for venereal disease control for a period of seven months.

News from University of Virginia, Department of Medicine.

Dr. H. B. Mulholland spoke before the last meeting of the Piedmont Medical Society, in Culpeper, on the subject of Rocky Mountain Spotted Fever. Dr. Samuel A. Vest, Associate Professor of Urology, spoke on the subject of The Clinical Use of Testosterone.

Dr. J. Edwin Wood spoke before the James River Medical Society at its meeting in Arvonia, on Hypertension. Dr. H. B. Mulholland read a paper on The Common Causes of Indigestion.

Dr. Oscar Swineford, Jr. addressed the Southside Community Hospital Staff in Farmville, recently. His subject was Hodgkin's Disease.

On August 29, Dr. W. W. Waddell addressed the Rockingham County Medical Society, meeting in Lexington, on the subject Vitamin K in the Newly Born.

News from Duke University.

Miss Margaret I. Pinkerton has been appointed Dean of the School of Nursing and commenced her duties about October 1. Miss Pinkerton was graduated from the University of Virginia School of Nursing in 1927 and received her Bachelor of Science degree in Nursing from Teachers College, Columbia University, in 1933. She has been Assistant Superintendent of Nurses at the Stuart Circle Hospital in Richmond; Assistant Superintendent of Nurses at the University of Virginia; Instructor in Nursing Arts at Washington University School of Nursing, St. Louis; and Superintendent of Nurses at the Barnes Hospital, St. Louis, since 1938.

Of the 316 graduates of the Duke University School of Medicine, from the first class of 1932 through 1939, 204 are still engaged in interneships at various hospitals, and 112 are in practice. Of the latter, thirty-four or 30 per cent are in practice in twenty-six towns in North Carolina, and thirty-six are in practice in eleven other southern states, making a total of seventy or 62 per cent in practice in the South. Seven Duke graduates are in practice in West Virginia, six in Virginia, five each in South Carolina and Florida, three each in Alabama and Texas, two each in Georgia and Louisiana, and one each in Mississippi, Maryland and Kentucky.

Dr. Charles W. Warren,

Class of '36, Medical College of Virginia, who has recently been at the U. S. Marine Hospital in Baltimore, has resumed his practice in Upperville and will also be affiliated with the Middleburg Health Center.

Correction.

In the program of the annual meeting of the Medical Society of Virginia, in the September MONTHLY, it was stated that Dr. Eugene M. Landis, one of the speakers at the first general session on Wednesday, the 4th, was Dean of the Department of Medicine at the University of Virginia. This was an error as Dr. Harvey E. Jordan was several months ago named dean of the Medical School at the University, succeeding Dr. J. C. Flippin. Dr. Landis' title should have been Professor of Internal Medicine.

Personnel Notes from State Health Department.

Dr. P. R. Cronlund, formerly assistant health officer in Pulaski County, has been appointed to succeed Dr. James R. Suter as director of the Lee County Health Department, the headquarters of which are in Jonesville. Dr. Suter will attend the

School of Hygiene and Public Health at Johns Hopkins University during the current academic year.

Dr. E. C. Gates, who has been health officer for the Washington-Bristol Health Department, with offices at Bristol, also will take the course in public health at Johns Hopkins this year. He has been succeeded by Dr. W. M. Moir.

Dr. M. E. McRae, formerly assistant health officer in the Brunswick-Greensville-Mecklenburg Health Deparment, has been appointed health officer of the Pittsylvania County Health Department. He succeeds Dr. E. B. Shepherd, who has resigned to enter private practice. Headquarters for this department are in Chatham.

Dr. T. S. Englar has assumed the duties of health officer of the Albemarle-Charlottesville Health Department, offices of which are in Charlottesville. Dr. R. D. Hollowell, the former health officer, has resigned to accept the position as director of the Shelby County health department in his native state of Tennessee.

Dr. J. D. Hamner, for some time Henrico County health officer, is another of the doctors who has been designated by the State Health Department to take a postgraduate course in public health at Johns Hopkins University, and began his studies on September 20.

Dr. Edwin A. Harper,

Lynchburg, announces the removal of his office on September 1 to 301 Rivermont Avenue, that city. Dr. Harper was recently certified in Pediatrics by the American Board of Pediatrics.

Dr. Hugh B. Magill, Jr.,

Recently of Tappahannock, is now located at Gastonia, N. C., where he is engaged in general practice.

Dr. Robley D. Bates, Jr.,

Class of '34, Medical College of Virginia, who interned at Johnston-Willis Hospital, Richmond, and later was on service at the Hospital for Women and the Union Memorial Hospital in Baltimore, has located in Richmond, with offices in Professional Building. He will be engaged in the practice of internal medicine.

Dr. Louise Leland Clark,

Class of '37, Medical College of Virginia, has located in Chester, where she will be engaged in general practice. After an internship at Memorial Hospital, Richmond, Dr. Leland spent a year at the University of Maryland Hospital, serving a residency in pediatrics.

Dr. William D. Tillson,

Who has been director of the Bureau of Industrial Hygiene of the Virginia State Health Department since its creation in July 1936, has resigned this position to become medical director of the American Viscose Corporation at Parkersburg, W. Va., and will enter upon his new duties on November 1.

Postgraduate Clinic at University of Virginia.

The sixth postgraduate clinic will be held at the University Hospital, Charlottesville, December 5, 6, 7 and 8. The first two days will be limited to ophthalmology and the last two to otolaryngology. The program has not yet been completed.

Red Cross Cooperation With Medical Profession.

Red Cross first aid instruction has been going on since 1909. One of the points that is repeatedly emphasized in all classes, and more than 2,000,000 persons have been taught, is that first aid treatment is never designed to take the place of professional medical assistance. Its purpose merely is to bridge the gap between the time accident occurs and the arrival of a doctor or ambulance.

In recent years the Red Cross has established a chain of highway emergency first aid stations, operated by trained volunteers. Time and again these people, through their efforts, have been able to save life. At Red Cross National Headquarters are many reports testifying to their excellent work. One such first aid station, during a recent year turned in fifty-three reports of assistance rendered. These covered thirty-six motor vehicle accidents, nineteen serious cuts and injuries to neighbors, from dog and snake bites, two pedestrians struck by hit and run drivers, one shot-gun wound, and one injury sustained by a child when a washing machine fell on him.

All Red Cross services are finanaced by membership. Only in times of great disaster are special contributions and gifts solicited. This year it is planned to augment membership by 1,000,000. The medical profession of Virginia will again be called upon to cooperate with the Red Cross during the forthcoming

Roll Call, which begins November 11 and ends November 30, when all are invited to affiliate with their local Red Cross chapters.

Richmond Doctors Move.

The following Richmond doctors announce the removal of their offices:

Dr. Carl Meador to 201 North Boulevard.

Dr. Basil B. Jones to 1004 West Franklin Street.

Dr. Algie S. Hurt, Jr., to 1004 West Franklin Street.

Dr. R. Angus Nichols, Jr., to 1004 West Franklin Street.

Dr. Homer E. Ferguson to 923 West Franklin Street.

Dr. W. R. Morton to 923 West Franklin Street.

Dr. T. B. Pearman to 923 West Franklin Street.

Dr. Bruce Randolph to 923 West Franklin Street.

Dr. J. A. Rollings to 923 West Franklin Street.

Dr. George Snead to 923 West Franklin Street.

Dr. T. B. Washington to 923 West Franklin Street.

Dr. W. E. Jennings,

Danville, returned to his office on September 15, after an absence of nearly three months, due to illness and a major operation. He has recovered sufficiently to take over his practice.

Home for Convalescences.

A home for the care and treatment of chronic convalescences has been opened at Arrington, Nelson County, Virginia, under the direction of Dr. and Mrs. Fred M. Horsley. Information upon request. (*Adv.*)

Obituary Record

Dr. Walter Jones Adams,

Prominent physician of Norfolk, where he practiced for forty years, died September 16, following an operation. He was seventy-four years of age and a graduate of the Medical College of Virginia in 1895. Dr. Adams served as acting assistant surgeon in the U. S. Public Health Service before he began private practice. He had been a member of the Medical Society of Virginia for forty-two years. One of his sons is Dr. Walter P. Adams of Norfolk.

Dr. James Edward Rudasill,

Hume, died August 2 of heart disease. He was sixty-seven years of age and a graduate in medicine from the University of Pennsylvania, class of 1893. Dr. Rudasill was active in the social and religious life of his community, serving as Superintendent of the Baptist Church Sunday School. He had been a member of the Medical Society of Virginia for thirty years. Two brothers and three sisters survive him.

Dr. John Lewis Rawls,

Well known physician of Suffolk, was killed instantly in an automobile accident on September 5. He was fifty-three years of age and a graduate of the Jefferson Medical College, Philadelphia, in 1917. Dr. Rawls was a member of the staff of Lakeview Hospital and had been prominent in tuberculosis work in the State. He was a former president of the Suffolk Rotary Club and had been a member of the Medical Society of Virginia since 1923. His wife and two children survive him.

Dr. John McKendree Bailey,

Past president of the Hopewell Medical Association, died at his home there on September 22. He was a native of Westmoreland County, this State, and thirty-nine years of age. Dr. Bailey graduated from the Medical College of Virginia in the class of '24, and later took postgraduate work at the University of Pennsylvania. He had been practicing in Hopewell for about twelve years. His mother and two sisters survive him.

Dr. Peter Prentiss Causey,

Courtland, died June 5, at the age of sixty-six. He received his medical degree from the University of Maryland in 1897. Dr. Causey was Health Officer for Southampton County, and had been a member of the Medical Society of Virginia since 1902.

Dr. Bittle Cornelius Keister,

Washington, D. C., died May 3. He was a native of Virginia and eighty-two years of age. Dr. Keister graduated from the College of Physicians and Surgeons, Baltimore, in 1882, and for a number of years practiced medicine in Virginia. He had been a member of the Medical Society of Virginia for fifty-four years.

Dr. Robert Herman Rowe,

Abingdon, died of angina pectoris on June 14. He was fifty-one years of age and graduated in medicine from the University of Louisville in 1912. Dr. Rowe was formerly a member of the Medical Society of Virginia.

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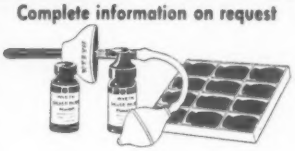

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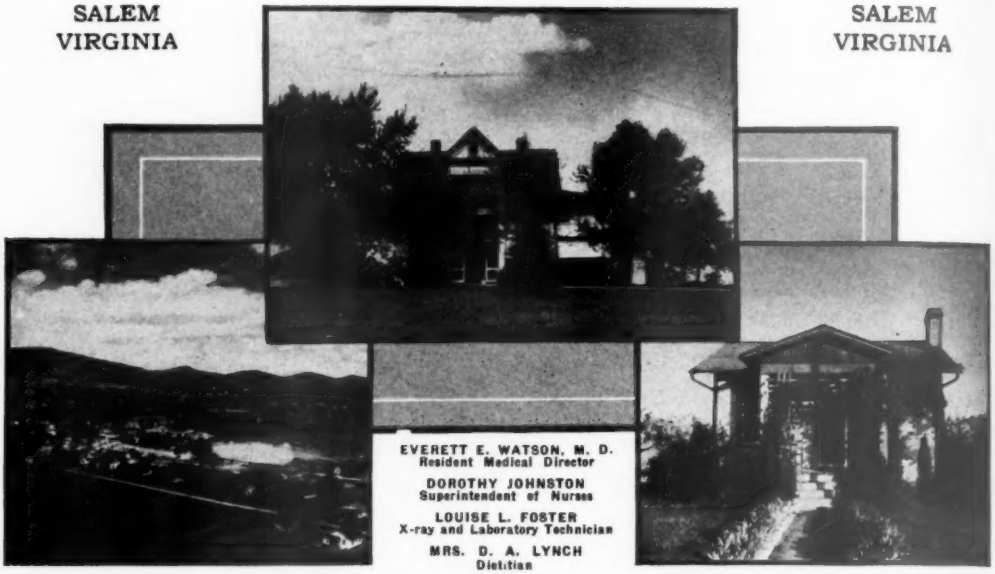

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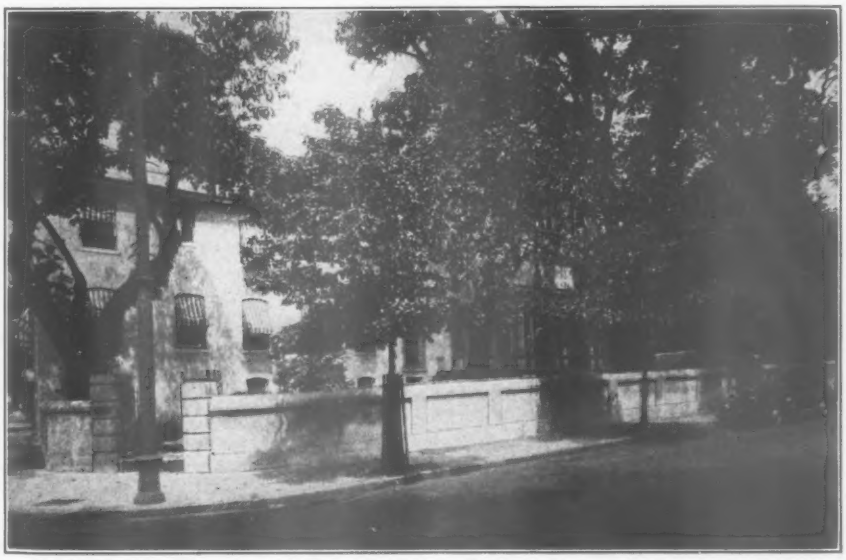

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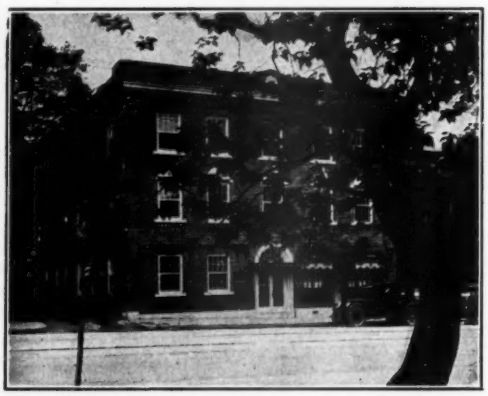

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Accomac County	O. R. Fletcher, Sanford	J. F. Edmonds, Accomac	Quarterly.
Albemarle County	F. D. Daniel, Charlottesville	Wm. H. Wood, Jr., Charlottesville	Monthly.
Alexandria City	F. I. Bloise, Alexandria	C. E. Arnette, Alexandria	Monthly.
Alleghany-Bath Counties	R. A. Warren, Hot Springs	R. P. Hawkins, Clifton Forge	Bi-Monthly.
Amelia County	J. M. Habel, Jetersville	J. L. Hamner Mannboro	
Arlington County	Alfred M. Palmer, Arlington	H. L. Bastien, Arlington	January, April, July, August.
Augusta County	D. E. Watkins, Waynesboro	J. E. Cox, Waynesboro	February, May, August, November.
Bedford County	M. P. Rucker, Bedford	W. V. Rucker, Bedford	Quarterly.
Botetourt County	S. F. Driver, Troutville	L. A. Micou, Eagle Rock	
Charlotte County	C. M. Nicholson, Charlotte C. H.	R. B. Cralle, Drakes Branch	
Clinch Valley Med. Society	E. P. Cox, Norton	C. B. Bowyer, Stonega	Spring and Fall.
Culpeper County	J. L. Stringfellow, Culpeper	O. K. Burnette, Culpeper	
Danville-Pittsylvania	E. E. Barksdale, Danville	S. C. Hall, Danville	
Dickenson-Buchanan Counties	P. Q. Daniel, Big Rock	T. C. Sutherland, Haysi	
Elizabeth City County	W. P. Smith, Hampton	R. H. Wright, Phoebus	
Fairfax County	R. E. Feagans, Fairfax	Alice Keissling, Falls Church	February, May, August, November.
Fauquier County	Stewart McBryde, Manassas	W. R. Pretlow, Warrenton	Monthly.
Floyd County	S. T. Yeatts, Floyd	F. C. Bedsaul, Floyd	
Fourth District Med. Society	M. R. Yates, Petersburg	C. E. Martin, Emporia	5 times a year.
Fredericksburg Med. Assn.	J. M. Holloway, Fredericksburg	T. B. Payne, Fredericksburg	Monthly.
Halifax County	D. C. Steelsmith, South Boston	W. C. Brann, South Boston	
Hanover County	Hawes Campbell, Jr., Hanover	F. L. Hughes, Ashland	Bi-Monthly.
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James River Med. Society	J. H. Yeatman, Fork Union	E. J. Haden, Ore Bank	Quarterly.
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Mecklenburg County	H. H. Braxton, Chase City	W. W. Wilkinson, LaCrosse	
Med. Assn. Valley of Virginia	Fred'k Gochnauer, Upperville	H. W. Miller, Woodstock	September.
Med. Soc. Northern Virginia	O. W. Carper, Front Royal	J. E. Harris, Winchester	
Medical Society of Virginia	A. F. Robertson, Jr., Staunton	Agnes V. Edwards, Richmond	Richmond, Fall 1939.
Mid-Tidewater Med. Society	J. R. Parker, Providence Forge	M. H. Harris, West Point	January, April, July, October.
Nansemond County	E. C. Joyner, Suffolk	T. E. Scarlett, Suffolk	
Nelson County	B. F. Randolph, Arrington	J. F. Thaxton, Tye River	
Norfolk County	Harvie S. Baker, Norfolk	L. B. Scott, Norfolk	Weekly.
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Patrick-Henry Counties	J. A. Shackelford, Martinsville	R. H. Walker, Martinsville	January, April, July, October.
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Princess Anne County	H. F. Dormire, Va. Beach	W. L. Taylor, Va. Beach	
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Scott County	C. R. Fugate, Clinchport		
Seaboard Med. Assn.	Julian L. Rawls, Norfolk	C. P. Jones, Newport News	December 12-14, 1939, Virginia Beach, Va.
Southampton County	Jack Grizzard, Branchville	W. T. McLemore, Courtland	April and September.
South Piedmont Med. Society	A. P. Bohannon, Virgilina	J. A. Owen, Turbeville	Spring and Fall.
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Southwestern Virginia	C. F. Manges, Blacksburg	James King, Radford	March and September.
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Tri-State Med. Assn. Va. & N. C.	J. F. Highsmith, Fayetteville, N. C.	J. M. Northington, Charlotte, N. C.	Charleston, S. C., February, 1939.
Va. Neuropsychiatric Society	H. C. Henry, Richmond	E. H. Williams, Richmond	
Va. Orthopedic Society	R. M. Hoover, Roanoke	B. H. Kyle, Lynchburg	Richmond, Fall 1939.
Va. Pediatric Society	W. W. Waddill, Charlottesville	J. M. Bishop, Roanoke	Richmond, Fall 1939.
Va. Peninsula Academy of Med.	H. G. Longaker, Newport News	E. B. Mewborne, Newport News	3rd Mondays.
Va. Roentgen Ray Club	F. M. Hodges, Richmond	V. W. Archer, Charlottesville	Richmond, Fall 1939.
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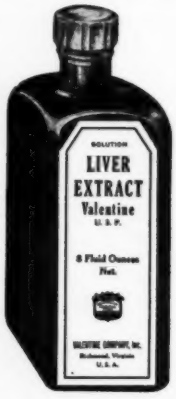

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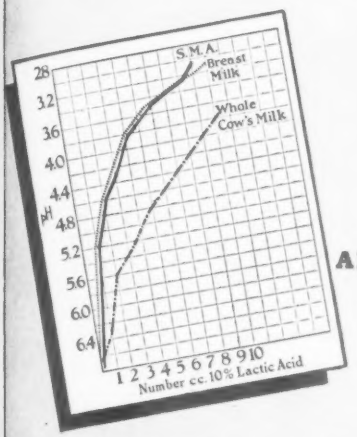

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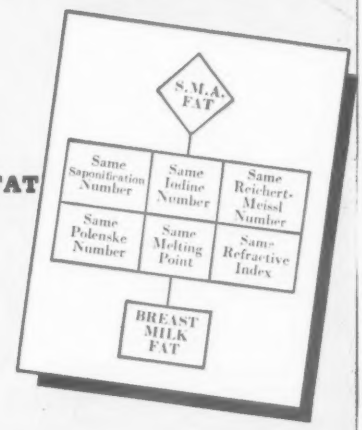

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*Frazer, J. G.: The Golden Bough, vol. 1, New York, Macmillan & Co., 1923

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